Belyayev, A. I.

137-1958-2-2593

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 2, p 55 (USSR)

AUTHORS: Firsanova, L. A., Belyayev, A. I.

TITLE: Obtaining Pure Beryllium Chloride by Chlorinating Beryl (Polucheniye chistogo khlorida berilliya khlorirovaniyem berilla)

PERIODICAL: Sb. nauchn. tr. Mosk. in-t tsvetn. met. i zolota i VNITO tsvetn. metallurgii, 1957, Nr 26, pp 184-192

ABSTRACT: Laboratory tests were made to ascertain the feasibility of chlorinating beryl with Cl_2 and recovering pure $BeCl_2$ from a mixture of Be, Al, Fe, and Si chlorides by vacuum distillation and re-distillation. The possibility is shown of a direct chlorination of beryl with Cl_2 in the presence of carbonaceous substances at 1200-1300°, with a resulting mixture of chlorides. Conditions of fractional distillation and vacuum re-distillation were studied in detail. The beryl used was composed of 11.5 percent BeO, 18.0 percent Al_2O_3, 60.0 percent SiO_2, 4.1 percent Fe_2O_3. Before vacuum distillation the $BeCl_2$ contained 0.6 percent $FeCl_3$ and 1.59 percent $AlCl_3$. Vacuum-distilled it contained 0.12 percent $FeCl_3$ and 0.086 percent $AlCl_3$. G. S.

Card 1/1

1. Beryllium chloride--Production--Theory

SOV/137-58-7-14644

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 7, p 100 (USSR)

AUTHORS: Belyayev, A.I., Firsanova, L.A.

TITLE: Melting Al-Si Alloys from Secondary Aluminum Treatment Slimes (Vyplavka splavov Al-Si iz shlamov ot pererabotki vtorichnogo alyuminiya)

PERIODICAL: Sb. nauchn. tr. Mosk. in-t tsvetn. met. i zolota i VNITO tsvetn. metallurgii, 1957, Nr 26, pp 162-171

ABSTRACT: A description is offered of the results of laboratory and larger-scale experiments in the melting of slimes and the distillation of Al from the alloys obtained. The possibility is established of obtaining Al-Si alloys containing 50-60% Al in reduction melts. These melts, enriched by filtration under pressure, can be used to distill pure Al via an Al subchloride in a vacuum distillation furnace using graphite heaters.

L.P.

1. Aluminum-silicon alloys--Production

Card 1/1

137-58-4-6569

An Investigation of the Physical (cont.)

D > 0.2 amps/cm^2, Al losses diminish. Liberation of Na at the cathode is diminished somewhat by adding either CaF_2 or MgF_2. The density of $NaF+AlF_3$ melts increases under the effect of MgF_2 to a lesser degree than under the effect of CaF_2. The electric conductivity of $NaF+AlF_3$ melts diminishes under the effect of addition of 5% CaF_2 + 5% MgF_2 a little more than under the effect of addition of 7% CaF_2. On the whole, MgF_2 exercises a more favorable effect on the physical chemical properties of the electrolyte in Al baths than does CaF_2, and it is therefore desirable to use MgF_2 as a component of the electrolyte.

I. G.

1. Aluminum coatings 2. Electrolytes--Properties--Analysis

Card 2/2

137-58-4-6569

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 4 p 36 (USSR)

AUTHORS: Belyayev, A.I., Zhemchuzhina, Ye.A., Firsanova, L.A.

TITLE: An Investigation of the Physical Chemical Properties of Aluminum Bath Electrolyte Containing Magnesium Fluoride (Issledovaniye fiziko-khimicheskikh svoystv elektrolita alyuminiyevykh vann, soderzhashchego ftoristyy magniy)

PERIODICAL: Sb. nauchn tr. Mosk. in-t tsvetn-met. i zolota i VNITO tsvetn. metallurgii, 1957, Nr 26, pp 143-161

ABSTRACT: MgF depresses the temperature of onset of crystallization of $NaF+AlF_3$ melts more than does CaF_2. The rate of solution of Al_2O_3 in melts containing MgF_2 is higher than that of melts containing CaF_2. MgF_2 increases the wetting angle of coal by $NaF+AlF_3$ melts more than does CaF_2. The critical D of melts of $NaF+AlF_3$ with added MgF_2 is greater than the critical D of the same melts containing CaF_2. Losses of Al in melts of $NaF+AlF_3$ with added MgF_2 are smaller than the losses of Al in melts with added CaF_2. When direct current is superimposed, the losses depend upon the D_k, while when

Card 1/2

An Investigation of the Reaction (cont.)

titanate. The simultaneous presence of Ti and Fe oxides during the leaching of alumina also weakens the negative effect of TiO_2 somewhat. The presence of MgO and BaO in addition to CaO increases alumina extraction in the leaching of diaspore-bemite bauxites. The best results in the leaching of bauxites by NaOH solution are attained by addition of MgO.

G S

1. Bauxite components--Reaction 2. Autoclave--Processes--Applications

Card 2/2

BELYAYEV, A.I.

137-58-4-6798

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 4, p 69 (USSR)

AUTHORS: Belyayev, A.I., Kolenkova, M.A.

TITLE: An Investigation of the Reaction Between Bauxite Components in Autoclave Leaching (Issledovaniye vzaimodeystviya komponentov boksita pri avtoklavnom vyshchelachivanii)

PERIODICAL: Sb. nauchn. tr. Mosk. in-t tsvetn. met. i zolota i VNITO tsvetn. metallurgii. 1957, Nr 26, pp 120-131

ABSTRACT: The reactions of Na_2O, Al_2O_3, Fe_2O_3, TiO_2, and CaO under conditions of leaching by an NaOH solution at elevated pressure (and temperature) were investigated. It was found that no chemical reaction occurs under these conditions between TiO_2 and Na_2O, or between Fe_2O_3 and Na_2O. The presence - separately - of Ti, Fe and Ca oxides during the leaching of alumina results in diminution of the extraction of alumina in the solution, Ti oxide demonstrating this most strongly. CaO causes the formation of an insoluble Ca hydroaluminate during leaching. The simultaneous presence of Ti and Ca oxides significantly diminishes the negative effect of TiO_2 and CaO by formation of dicalcium

Card 1/2

136-11-9/17

Investigation of the Physico-chemical Properties of Electrolytes of Industrial Aluminum Electrolyzers

the fall in potential in the electrolyte layer indirectly to be avoided since they provide quantitative values for the resistivity of commercial electrolytes as well as for the other properties.
There are 7 figures, 4 tables and 12 references, of which 9 are Russian and 3 Swedish.

AVAILABLE: Library of Congress
Card 2/2

1. Electrolytes-Properties-Analysis

BELYAYEV A.I.

AUTHORS: Novikov, N.I. and Belyayev, A.I. 136-11-9/17

TITLE: Investigation of the Physico-chemical Properties of Electrolytes of Industrial Aluminum Electrolyzers (Issledovaniye fiziko-khimicheskikh svoystv elektrolitov promyshlennykh alyuminiyevykh elektrolizerov)

PERIODICAL: Tsvetnyye Metally, 1957, No.11, pp. 46 - 53 (USSR).

ABSTRACT: The authors describe their laboratory experiments on the melting points, density, viscosity and electrical conductivity of electrolytes taken directly from aluminium-production electrolysers chosen so as to cover the whole range of basicity encountered in practice. Palladium apparatus was found to be suitable for dealing with the fluoride and carbon-containing melts. Primary crystallisation temperatures were measured for samples taken in the course of a period between two preparations of the bath, and the temperatures are related to the cryolite ratio (Fig.1). Densities were measured for each sample for a temperature range of 100 - 120 °C, starting from 7 above the crystallisation point. Viscosities were determined by a rotating pendulum method for the same electrolytes and the same temperature ranges. The authors discuss their results with reference to electrolyser operation and design and suggest that they enable the unsatisfactory design practice of determining

Card 1/2

Study of electrode processes in the electrolytic refining of aluminium.

discharge of aluminium ions and on the anode the electrochemical solution of aluminium. In the fluoride electrolyte polarization of -510, -605 and +0.0 MV correspond to the start of discharge of barium, lithium + sodium and chlorine ions, respectively; in the fluoride electrolyte -575 and +340 MV correspond to start of discharge of sodium and fluorine, respectively. In commercial cells the mean back e.m.f. was 370 MV, a figure which the authors recommend for calculation purposes. As an additive they recommend lithium fluoride (5-6% by weight) or 55% $BaCl_2$ + 35% AlF_3.1.5 NaF + 10% NaCl. The authors state that the use of fluoride electrolyte for primary aluminium refining is unsuitable but can be recommended for secondary metal containing magnesium.

The following assisted in the full-scale tests: S. Ye. Vol'fson, Ya. Sh. Katon and I. A. Baldovskiy.

Card 2/2 There are 12 figures, 1 table and 11 references - 7 Russian, 1 German, 1 Italian, 1 French, 1 English.

ASSOCIATION: Mintsvetmetzoloto.

AVAILABLE: Library of Congress.

1. Aluminum-Refining 2. Electrodes-Processes

BELYAYEV, A. I.

AUTHORS: Garmata, V.A. and Belyayev, A. I. 136-9-10/14

TITLE: Study of electrode processes in the electrolytic refining of aluminium. (Izucheniye elektrodnykh protsessov pri elektroliticheskom rafinirovanii alyuminiya).

PERIODICAL: Tsvetnyye Metally, 1957, No.9, pp. 58-66 (USSR).

ABSTRACT: The author describes and gives results of investigations of electrode processes during the electrolytic refining of aluminium by the three-layer method. The experiments were based on the study of polarization at the cathode and anode in relation to the current density, temperature, composition of the electrolyte, electrode material, nature of the ionic diffusion and other factors. Laboratory experiments for studying these factors were carried out in a special cell (Fig.1) and further laboratory work on the determination of the electrical-conductivity, density and liquidus temperatures of chloride-fluoride and fluoride electrolytes were made in a palladium cell. Back e.m.f. and polarization of electrodes were studied on industrial cells, with oscillographic recording of current and voltage (Figs.7 and 10). The authors conclude that in the electrolysis of chloride-fluoride (60% $BaCl_2$ + 23% AlF_3 + 17% NaF) and fluoride (48% AlF_3 + 18% NaF + 18% BaF_2 + 16% CaF_2) the primary process on the cathode is the

Card 1/2

Tests of magnesium fluoride as a component of aluminium-bath electrolyte. (Cont.) 136-5-11/14

containing electrolytes, started at the Ural Aluminium Works (Uralskom Alyuminievom Zavode) in 1955 and is still continuing. These tests have shown the following favourable effects of MgF_2 additions: increased yield with respect to current and energy; a lower bath working temperature; decreased consumption of anodic material; higher CO_2 content in the anodic gases; lower consumption of aluminium fluoride; better operating conditions and improved working of the bath. Reasons for these effects are discussed and it is noted that favourable effects have also been obtained at aluminium works in Czechoslovakia and at Fushun in China (Chu Tzu Sen. "Influence of magnesium fluoride on the electrolysis of cryolite-alumina melts". Dissertation, Mukden, 1956.). At the latter works, sixteen MgF_2-containing baths are working at the present time. There are 7 references, 5 of which are Slavic.

Card 2/2

ASSOCIATION: Mintsvetmetzoloto.

AVAILABLE:

BELYAYEV, A.I.

AUTHOR: Belyaev, A.I., Zhemchuzhina, E.A. and Firsanova, L.A.

TITLE: Tests of magnesium fluoride as a component of aluminium-bath electrolyte. (Ispytaniya ftoristogo magniya kak komponenta elektrolita alyuminievykh vann.) 136-5-11/14

PERIODICAL: "Tsvetnye Metally" (Non-ferrous Metals), 1957, No.5, pp. 70 - 74 (U.S.S.R.)

ABSTRACT: In the first section of this work laboratory experiments to elucidate the joint influence of magnesium and calcium fluorides on the properties of aluminium-bath electrolyte are described. The results are shown graphically as a fusion diagram for the quasi-binary system: [2.5 $NaF.AlF_3$ + 5 wt % CaF_2 + 5 wt % MgF_2] - Al_2O_3; as a graph showing the influence of magnesite calcining temperature on the rate of its solution in cryolite melts at 1 000 and 1 020 °C; and as plots of solubility of aluminium in the electrolyte, solubility of alumina, angle of wetting, conductivity, density and melting point against the weight % of CaF_2 and MgF_2. The laboratory results indicate electrolytes should contain 6.5 - 7% MgF_2 for a total content of the fluoride of up to 10 wt %, a suitable cryolite ratio being 2.5 - 2.6. The second part of the paper deals with full scale tests of magnesium-fluoride

Card 1/2

BELYAYEV, A. I.

"Univalent Aluminum and its Role in the Electrometallurgy of Aluminum," paper presented at the Metallurgical Congress in Chicago, 6 Nov 1957.

Kalinin Inst. for Nonferrous Metals and Gold.

Eval. and Abst. B - 3,095,520, 6 Nov 1957

Belyayev, A.I.

LAKERNIK, Mark Moiseyevich; SEVRYUKOV, Nikolay Nikolayevich; BELYAYEV, A.I., prof., dokt.; retsenzent; VELLER, R.L., kand.tekhn.nauk; retsenzent; VANYUKOV, A.V., retsenzent; KROL', L.Ya., retsenzent; SAMSONOV, G.V., retsenzent; LEONIDOV, N.K., inzh., retsenzent; ZHEMCHUZHINA, Ye.A., red.; EL'KINA, L.M., red.izdatel'stva; MIKHAYLOVA, V.V., tekhn.red.

[Metallurgy of nonferrous metals] Metallurgiia tsvetnykh metallov. Moskva, Gos.nauchno-tekhn.izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 1957. 535 p. (MIRA 11:1)
(Nonferrous metals--Metallurgy)

BELYAYEV, Anatoliy Ivanovich; ZHEMCHUZHINA, Yelena Aleksandrovna; FIRSANOVA, Lidiya Alekseyevna; SKLYARENKO, S.I., professor, doktor, retsenzent; KRESTOVNIKOV, A.N., professor, doktor, retsenzent; CHERNOV, A.N., redaktor; ARKHANGEL'SKAYA, M.S., redaktor izdatel'stva; ATTOPOVICH, M.K., tekhnicheskiy redaktor

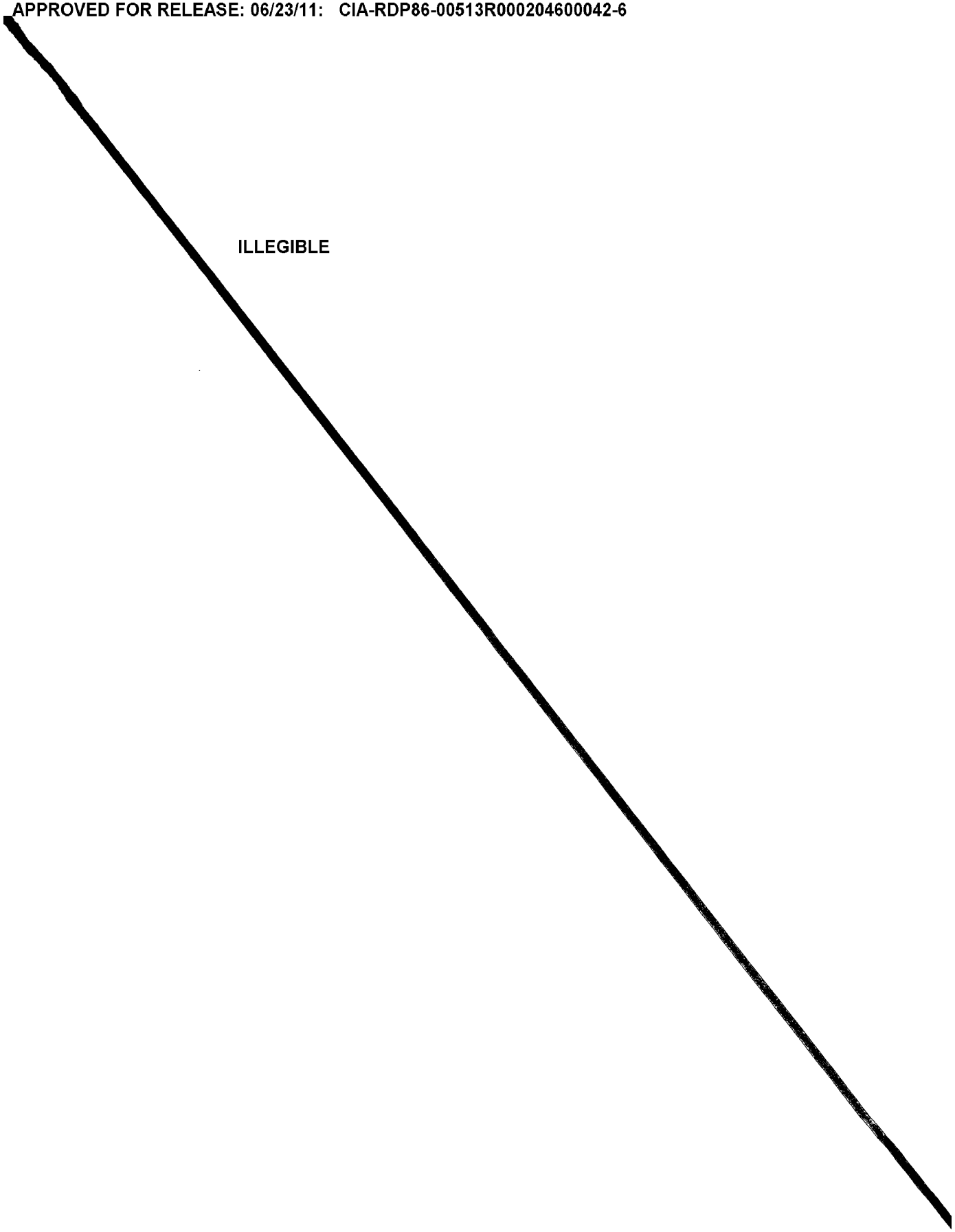
[Physical chemistry of soluble salts] Fizicheskaia khimiia rasplavlennykh solei. Moskva, Gos. nauchno-tekhn.izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 1957. 359 p. (MIRA 10:11)
(Salts, Soluble)

Белляев А. И.

BELYAYEV, Anatoliy Ivanovich; ZHEMCHUZHINA, Yelena Aleksandrovna; KOSOLAPOVA, E.F., red.; MIKHAYLOVA, V.V., tekhn.red.

[Microscopic analysis of carbon materials and electrodes] Mikroskopicheskii analiz uglerodistykh materialov i elektrodov. Moskva, Gos.nauchno-tekhn.izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 1957. 75 p. (MIRA 11:1)
(Coal) (Electrodes)

ILLEGIBLE



BELYAYEV, A.

Ninth Scientific and Technical conference of students of the Moscow Institute of Nonferrous Metals and of Gold. TSvet.met.29 no.6:72-73 Je '56. (MLRA 9:9)
(Nonferrous metals--Congresses)

BELYAYEV, A.I., professor, doktor.

Industrial aluminum-bath electrolytes and ways of improving them.
TSvet.met. 29 no.5:54-60 My '56. (MLRA 9:8)

1. Mintsvetmetzologo.
(Aluminum--Electrometallurgy)

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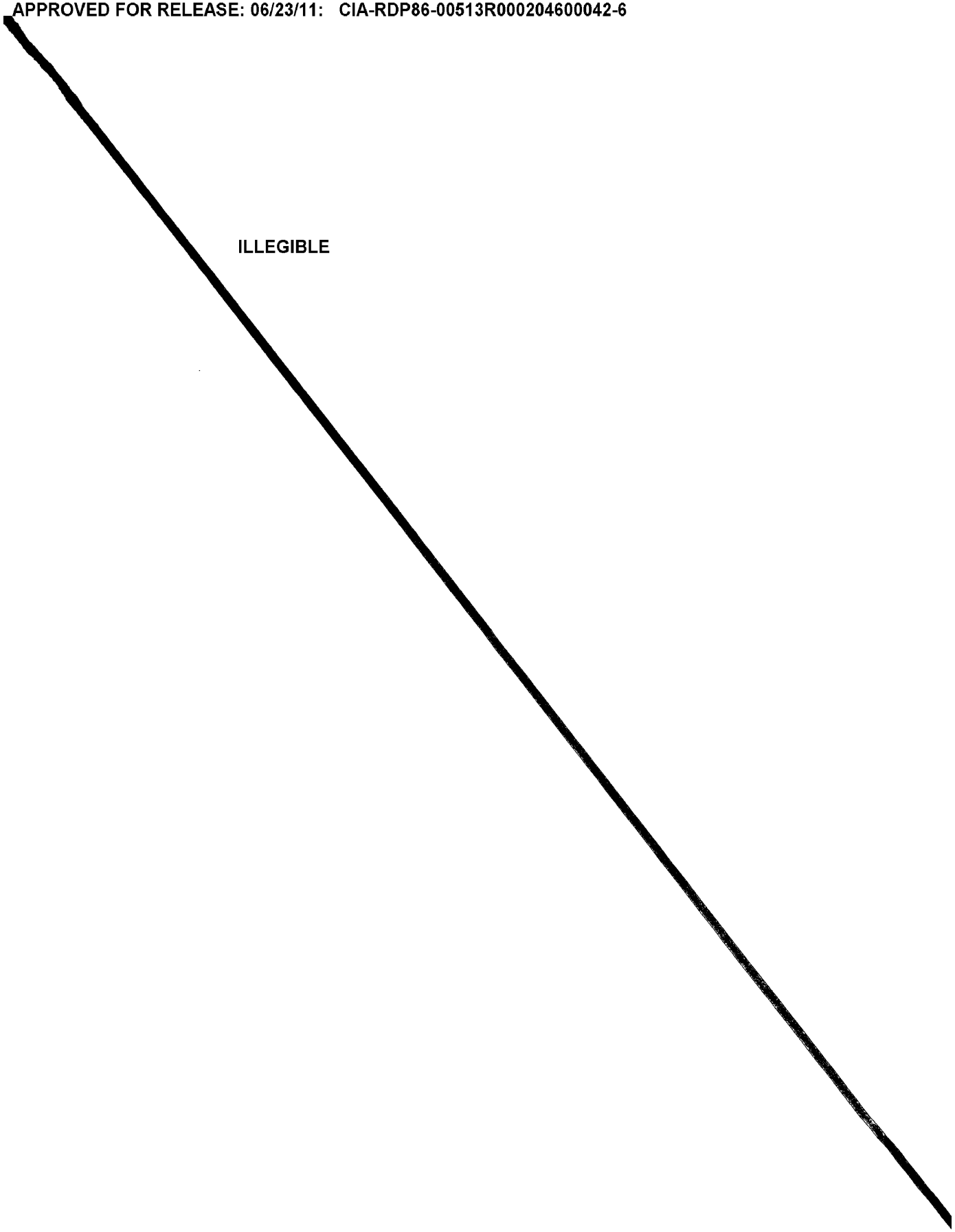

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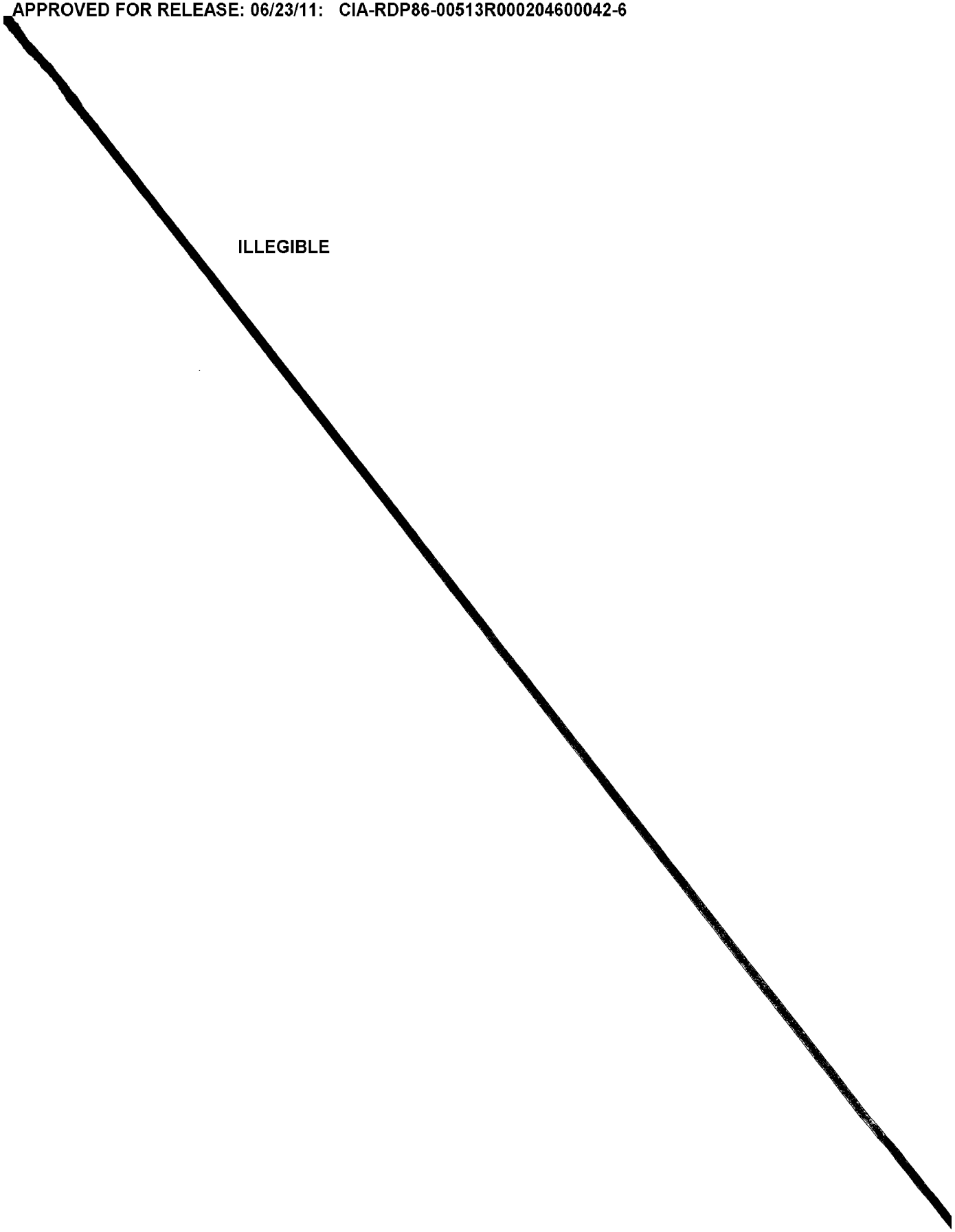

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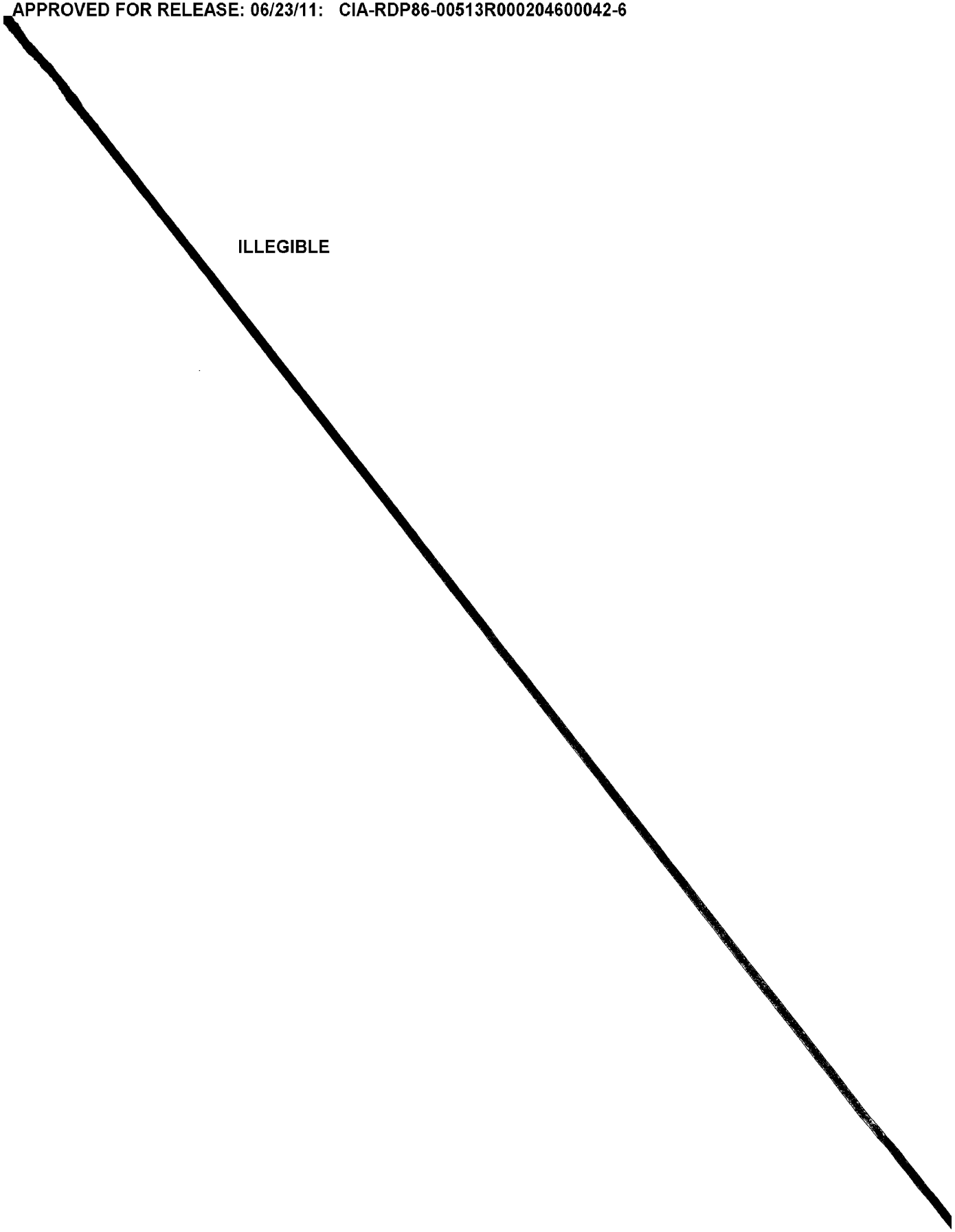

BELYAYEV, A.I.

BELYAYEV, A.I.

International Congress on Light Metals. TSvet.met. 28 no.6:55-57 N-D '55. (MIRA 10:11)
(Budapest--Nonferrous metals--Congresses)

BELYAYEV, A.I.

BELYAYEV, A.I.

Eighth scientific and technical conference of students of the Moscow Institute of Nonferrous Metals and Gold. TSvet.met. 28 no.3:75-77 My-je '55. (MIRA 10:11)
(Nonferrous metals)

Belyayev, A. I.

137-1957-12-23437

Translations from: Referativnyy zhurnal, Metallurgiya, 1957, Nr 12, p 87 (USSR)

AUTHOR: Belyayev, A. I.

TITLE: The Role of the Surface Phenomena in the Melting of Secondary Aluminum With Fluxes (Rol' poverkhnostnykh yavleniy pri plavke vtorichnogo alyuminiya s flyusami)

PERIODICAL: Sb. nauch. tr. Mosk. in-ta tsvetn. met. i zoloto, 1955, Nr 25, pp 180-194

ABSTRACT: Bibliographic entry

1. Secondary melting 2. Aluminum Fluxes-Applications

Card 1/1

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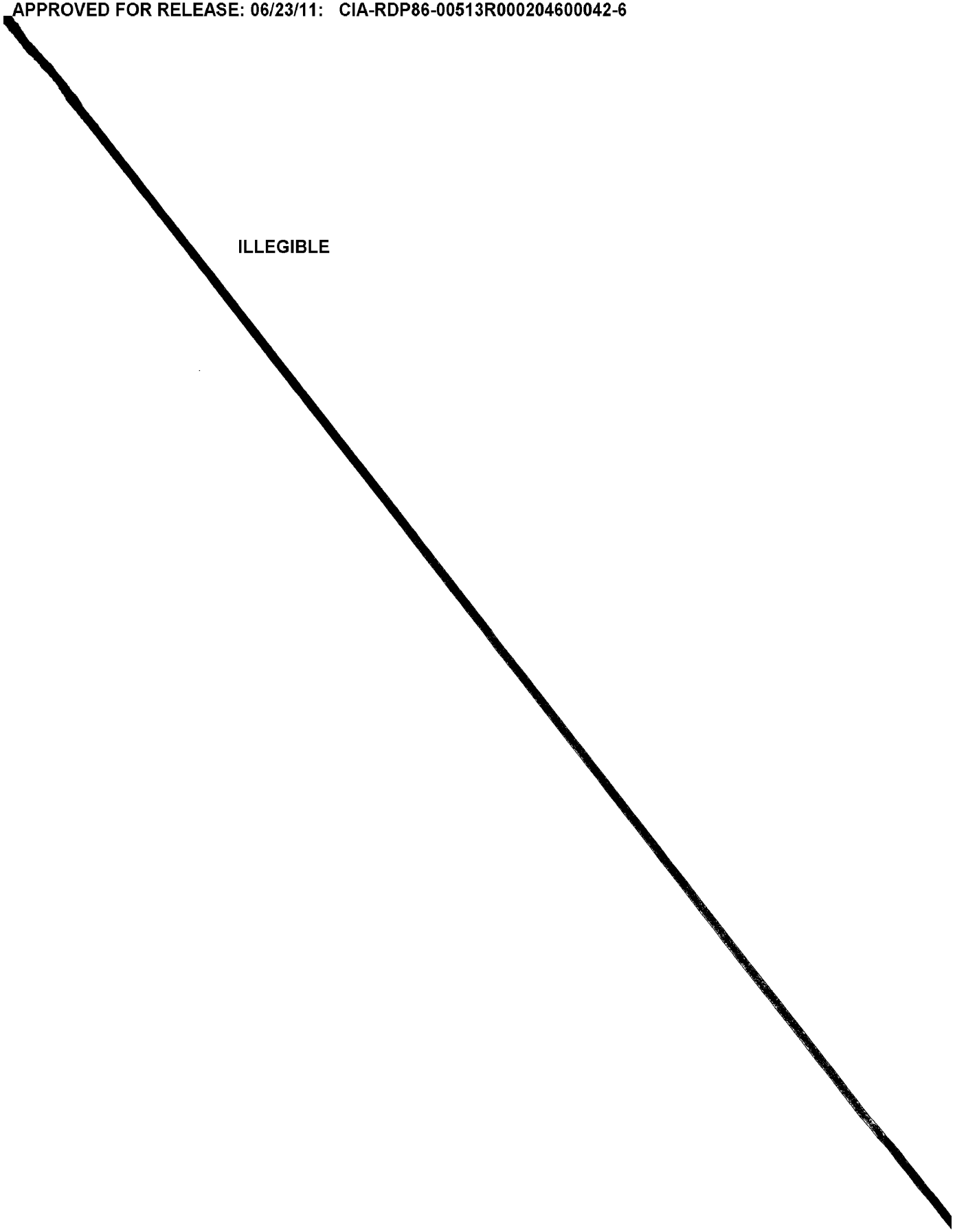

HUNGARIA/Chemical Technology. Chemical Products and Their Application. J-11
Electrotechnical Manufactures. Electrical Precipitation.
Chemical Sources of Current.

Abs Jour: Referat Zh.-Kh., No 8, 1957, 27571

Author : A.I. Beljajev.
Inst :
Title : Electrolyte Composition of Industrial Baths and Possibilities of Its Improvement.

Orig Pub: Kohasz. lapok, 1955, 10, No 12, 516-523.

Abstract: No abstract.

Card : 1/1 -14-

Belyayev, A.I.

BELYAYEV, A.I.; RAPPOPORT, M.B.; FIRSANOVA, L.A.

Causes for the destruction of carbon cathode blocks in starting aluminum cells. TSvet.met. 27 no.6:44-46 N-D '54. (MIRA 10:10)
(Cathodes) (Aluminum--Electrometallurgy)

BAYKONUROV, O.A.; BELYAYEV, A.I.; BOGOMOLOV, V.I.; VANYUKOV, V.A.; GAZARYAN,L.M.; GLEK, T.P.; GORYAYEV, M.I.; KARCHEVSKIY, V.A.; KLUSHIN, D.N., KUNAYEV, D.A.; LEBEDEV, B.N.; LISOVSKIY, D.I.; LOSKUTOV, F.M.; MITROFANOV, S.I.; MOLCHANOV, A.A.; MOSKVITIN, I.N.; OL'KHOV, N.P.; OSIPOVA, T.B.; PLAKSIN, I.N.; PONOMAREV, V.D.; RUMYANTSEV, M.V.; SOKOL'SKIY, D.V.; SOKOLOV, M.A.; SPASSKIY, A.G.; STRIGIN, I.A.; SUSHKOV, K.V.; SHAKHNAZAROV, A.K.; YASYUKEVICH, S.M.

Khosrov Kurginovich Avetisian, obituary. TSvet.met.27 no.3:66-68 My-Je '54. (MIRA 10:10)

(Avetisian, Khosrov Kurginovich, 1900-1954)

BELYAYEV, A.I.; FIRSANOVA, L.A.; ZHEMCHUZHINA, Ye.A.

Unsuppressed anode effects. TSvet.met.27 no.3:35-41 My-Je '54.
(MIRA 10:10)

1. Mintsvetmetzoloto.
(Aluminum--Electrometallurgy)

Belyayev, A.I.

AGEYEV, P.Ya.; ALABYSHEV, A.F.; BAYMAKOV, Yu.V.; BELYAYEV, A.I.; BATASHEV, K.P.; BUGAREV, L.A.; VASIL'YEV, Z.V.; GUPALO, I.P.; GUS'KOV, V.M.; ZHURIN, A.I.; VETYUKOV, M.M.; KOSTYUKOV, A.A.; LOZHKIN, L.N.; OL'KHOV, N.P.; OSIPOVA, T.V.; PERTSEV, I.I.; RUMYANTSEV, M.V.; STRELETS, Ye.L.; FIRSANOVA, L.A.; CHUPRAKOV, V.Ya.

Georgii Alekseevich Abramov. TSvet.met. 27 no.2:72-73 Mr-Ap '54. (MLRA 10:10)
(Abramov, Georgii Alekseevich, 1906-1953)

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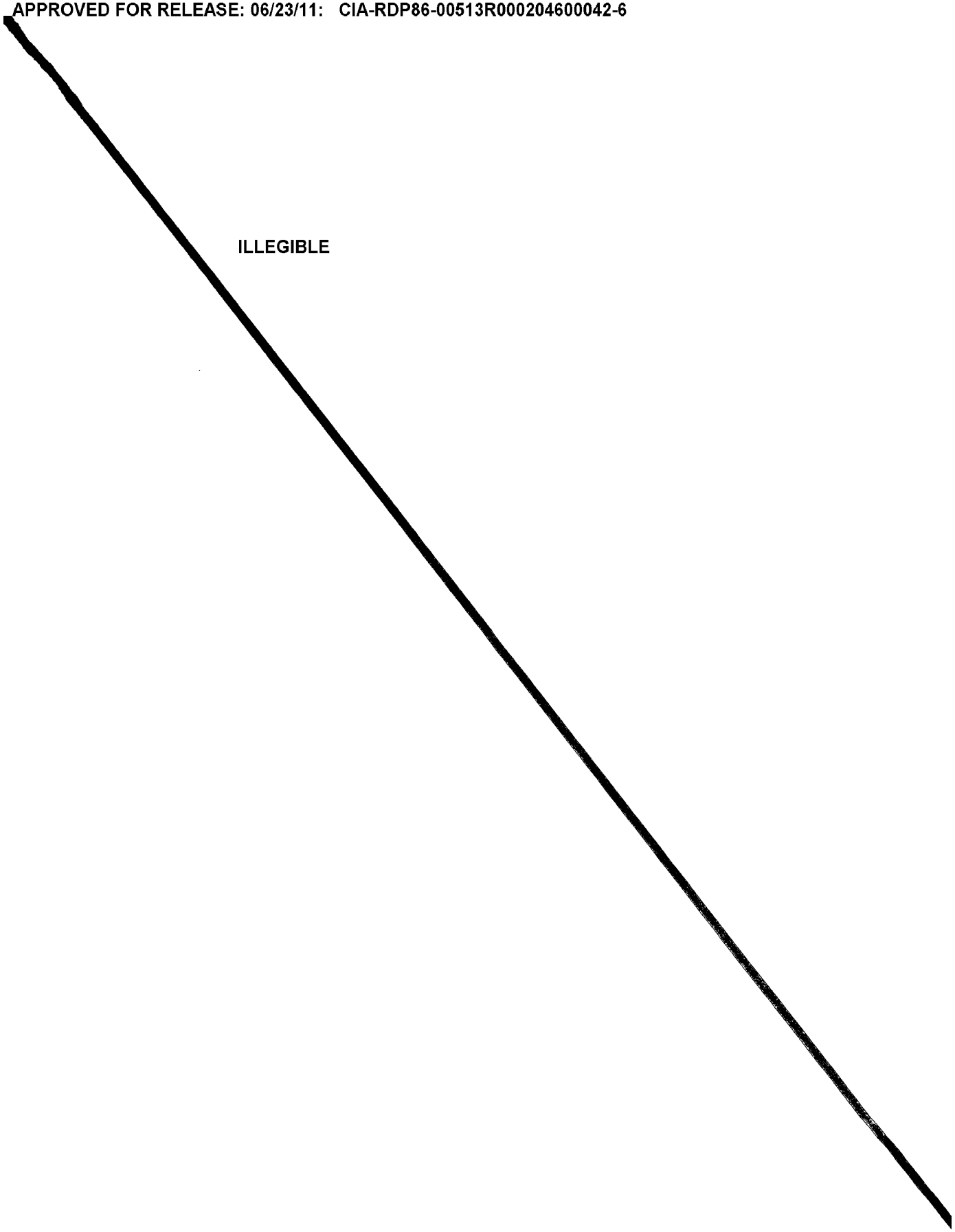

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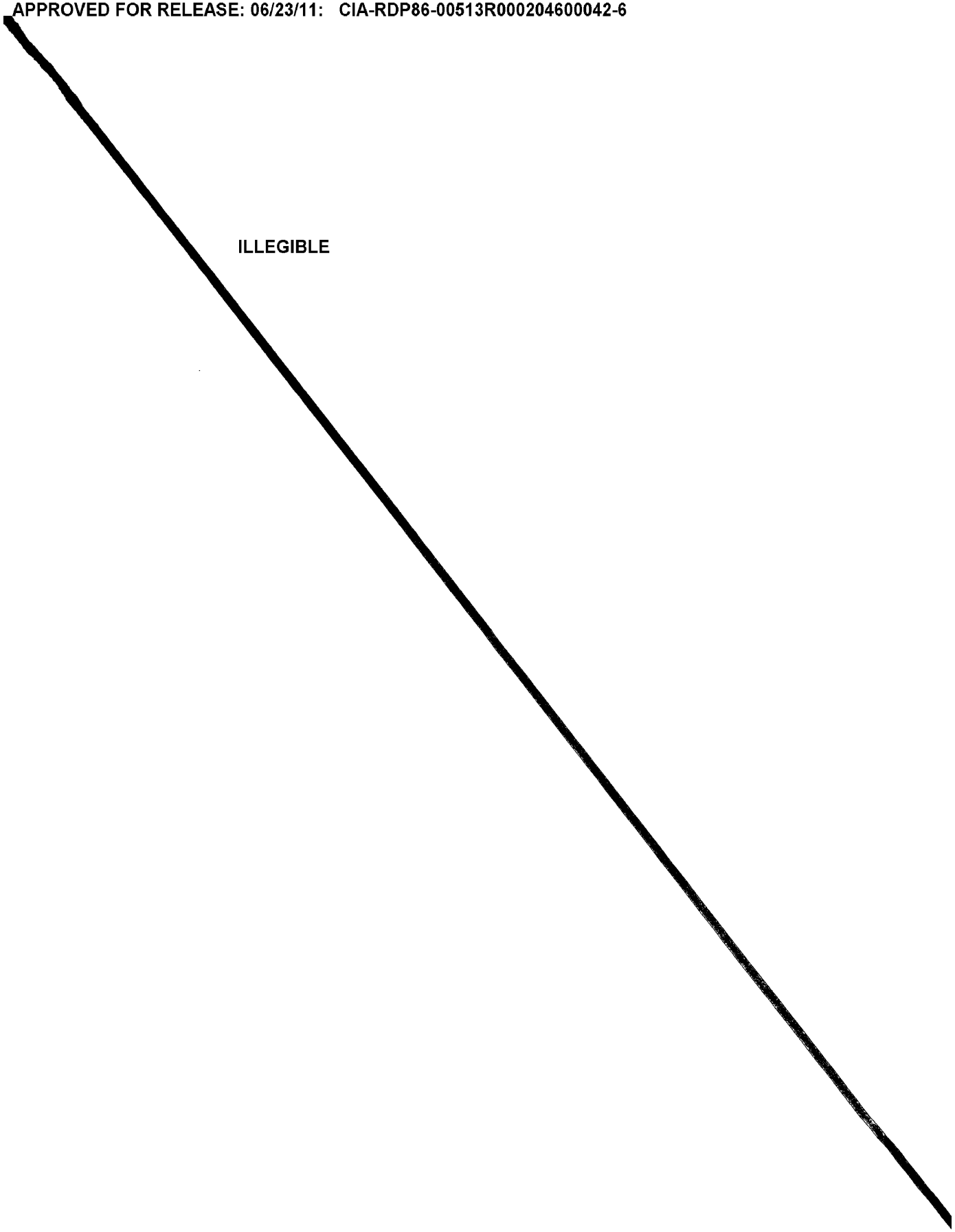

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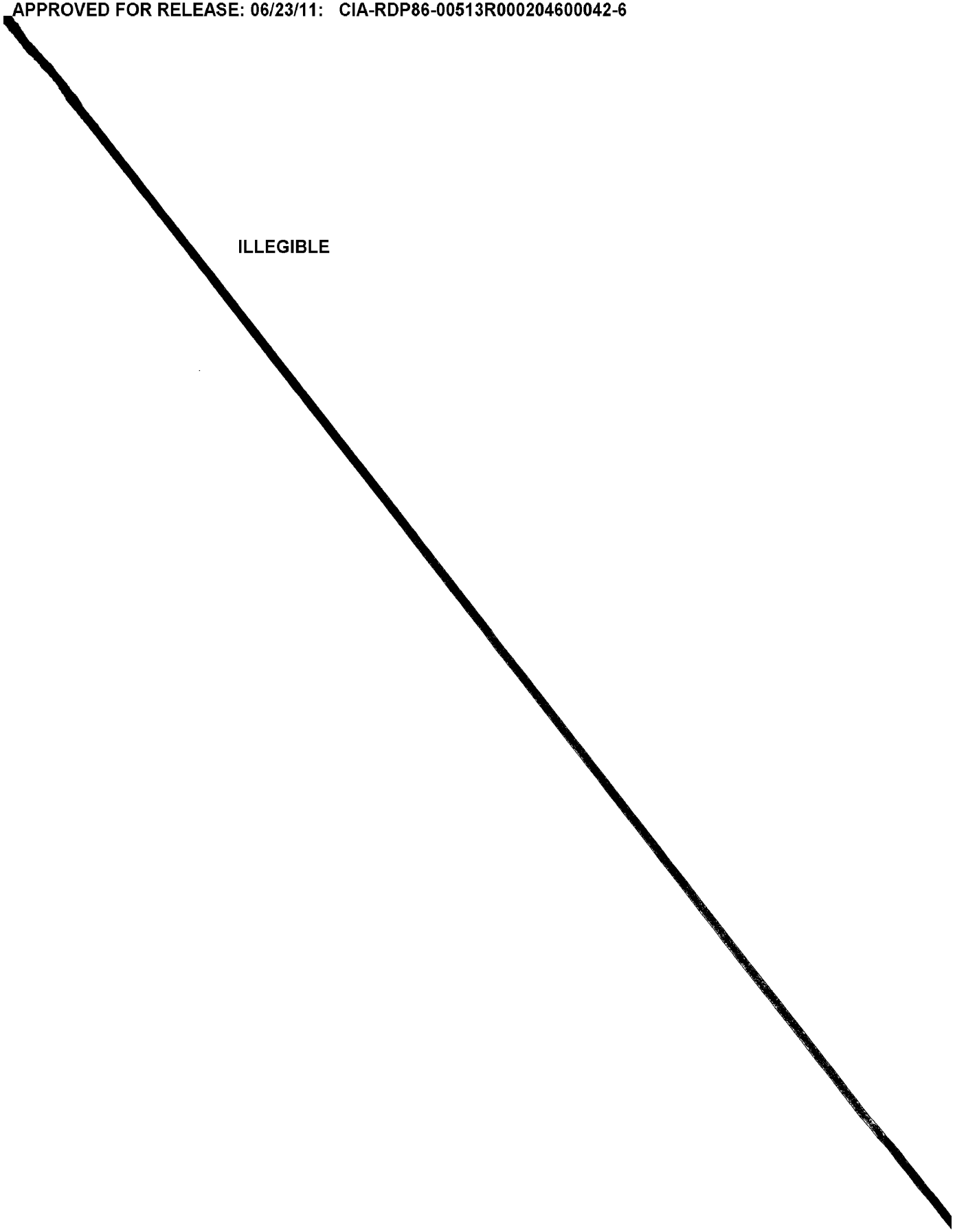

BELYAYEV, A.I.

N.N.Beketov, the outstanding Russian scientist. Trudy po ist. tekh. no.5:58-68 '54. (MLRA 8:1)
(Beketov, Nikolai Nikolaevich, 1826-1911)

Metallurgiya legkikh metallov (Obshchiy kurs) AID 608 - X
Chetv. izd.

No. of References: Russian 30 (1935-1953).
Facilities: Names of many Soviet scientists and workers are mentioned in the text.

Metallurgiya legkikh metallov (Obshchiy kurs) AID 608 - X
Chetv. izd.

Metallurgiya legkikh metallov (Obshchiy kurs)
Chetv. izd.

Metallurgiya legkikh metallov (Obshchiy kurs) AID 608 - X
Chetv. izd.

Metallurgiya legkikh metallov (Obshchiy kurs)
Chetv. izd.

ciples of the theory of its processing, and in detail the technology of its production.

Table of Contents

books on the same subject, it is found to include fewer metals and to present only the metallurgical side of their treatment. However, in this limited field the subject is covered much more extensively than in corresponding books in our literature, and no similar textbook in English could be found. Books which were consulted include: Bray, J. L., Non-Ferrous Production Metallurgy, 1947; Institution of Mining and Metallurgy, The Refining of Non-Ferrous Metals: Symposium, 1950; Roberts, E. R., The Extraction of Non-Ferrous Metals, 1950; Dennis, W. H., Metallurgy of the Non-Ferrous Metals, 1954; Hayward, C. R., An Outline of Metallurgical Practice, 1952; Malcuit, S. V., The Aluminum Industry, 1946, and various other books on metallurgy.

TEXT DATA

Coverage: This is a comprehensive textbook on the metallurgy of light metals, covering in detail aluminum and magnesium, and to a lesser extent, beryllium, calcium, barium and lithium. The book does not cover the field of mining or preparation of the ores. It also does not outline the fabrication of those metals and their products nor the technology of their alloys. Presented are: the properties of each of the above-mentioned light metals, its application, the prin-

BELYAYEV, A.I.

PHASE X TREASURE ISLAND BIBLIOGRAPHICAL REPORT AID 608 - X

Call No.: AF644431

BOOK

Author: BELYAYEV, A. I., Prof. Doc.
Full Title: METALLURGY OF LIGHT METALS. (GENERAL COURSE). 4th ed.
Transliterated Title: Metallurgiya legkikh metallov (Obshchiy kurs) Chetv. izd.

PUBLISHING DATA

Originating Agency: None
Publishing House: State Publishing House of Scientific and Technical Literature on Ferrous and Non-Ferrous Metallurgy
Date: 1954 No. pp.: 403 No. of copies: 9,500
Editorial Staff
Appraisers: Prof. Ye. I. Zhukovskiy; Staff of the Chair of Metallurgy of Light and Rare Metals of the Leningrad Mining Institute (Prof. Doc. N. S. Greyver, Prof. Doc. V. M. Gus'kov and Dotsents I. D. Tsaregorodtsev, P. V. Fileyev and V. K. Gusakovskiy).

PURPOSE AND EVALUATION: This is a textbook on the subject of the metallurgy of light metals approved by the Ministry of Higher Education for students of institutions of higher learning. This very well written and comprehensive book covers in detail the processes of metal production starting with the ores and extending to the obtaining of the pure metal. When compared with various American

Elektrometallurgiya alyuminiya AID 436 - I

Purpose: The book is intended to provide information on the subject treated for engineers, technicians and scientific workers of the aluminum industry as well as students of advanced courses in the electrometallurgy of aluminum.

Facilities: None

No. of Russian and Slavic References: Numerous Russian references in footnotes.

Available: Library of Congress.

Elektrometallurgiya alyuminiya

Elektrometallurgiya alyuminiya

reduction plants and calculation of aluminum baths and electric furnaces for melting aluminum-silicon alloys are briefly discussed. The theoretical part is based mainly on Soviet sources which, in the authors' opinion, by far excel in scope and scientific value the non-Russian literature on the electrometallurgy of aluminum. The practical conclusions are drawn from the achievements of the aluminum industry in the USSR, according to the authors' note in the preface. In the text, however, no reference is made to any installation in operation now in the Soviet Union.

The authors have collected in a single volume a large amount of information from the very extensive and extremely scattered references on the subject treated. The book is written in an easy, comprehensive language, is provided with numerous illustrations and diagrams, and gives a good picture of the methods used in electrolytic production of aluminum in the Soviet Union at the present time.

TABLE OF CONTENTS

BELYAYEV, A.I.

PHASE I TREASURE ISLAND BIBLIOGRAPHICAL REPORT AID 436 - I

BOOK Call No.: TN775.B337

Authors: BELYAYEV, A. I., RAPOPORT, M. B. and FIRSANOVA, L. A.

Full Title: ELECTROMETALLURGY OF ALUMINUM

Transliterated Title: Elektrometallurgiya alyuminiya

Publishing Data

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The authors express their thanks to Prof. Dr. V. A. Pazukhin, Prof. E. I. Zhukovskiy, Eng. A. I. Sushkov, Eng. G. I. Garbarchuk, Eng. B. I. Itsykson and P. K. Kovshikov.

Text Data

Coverage: This is a fundamental study of the modern development of aluminum alloy electrometallurgy. It gives a detailed analysis of the theory and practice of the electrolytic production of cryolite aluminum alloys, the electrolytic refining of aluminum and the production of aluminum-silicon alloys in electric furnaces. Design of

BELYAYEV, Aleksandr Ivanovich.

Nikolay Nikolayevich Beketov, Vydayushchiysya Russkiy Fiziko Khimik I Metallurg [Nikolay Nikolayevich Beketov, Outstanding Russian Physical Chemist and Metallurgist] 1827-1911. Moskva, Metallurgizdat, 1953.
130 p. Illus., Ports.

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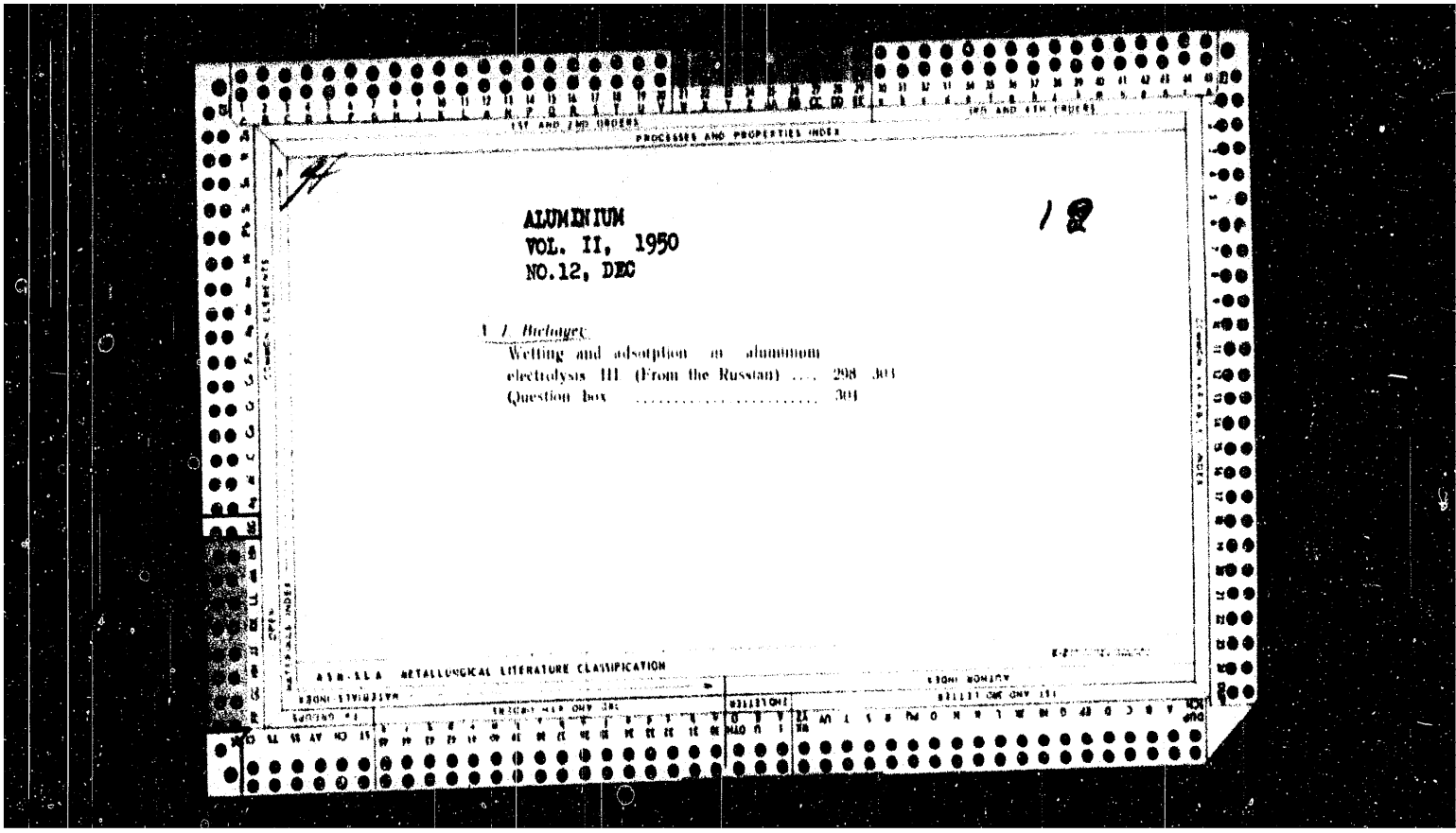
BELYAYEV, A.I.; ZHEMCHUZHINA, Ye.A.; PADALKA, Ye.N., kandidat tekhnicheskikh nauk; retsenzent; GULYANITSKIY, B.S., inzhener, retsenzent; DOKUKINA, Ye.V., redaktor; CHETVERIKOVA, L., tekhnicheskiy redaktor.

[Surface phenomena in metallurgical processes] Poverkhnostnye iavleniia v metallurgicheskikh protsessakh. Moskva, Gos. nauchno-tekhn. izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 1952. 143 p. [Microfilm] (MLRA 7:10)

(Metallurgy) (Surfaces (Technology)) (Surface chemistry)



PROCESSES AND PROPERTIES INDEX

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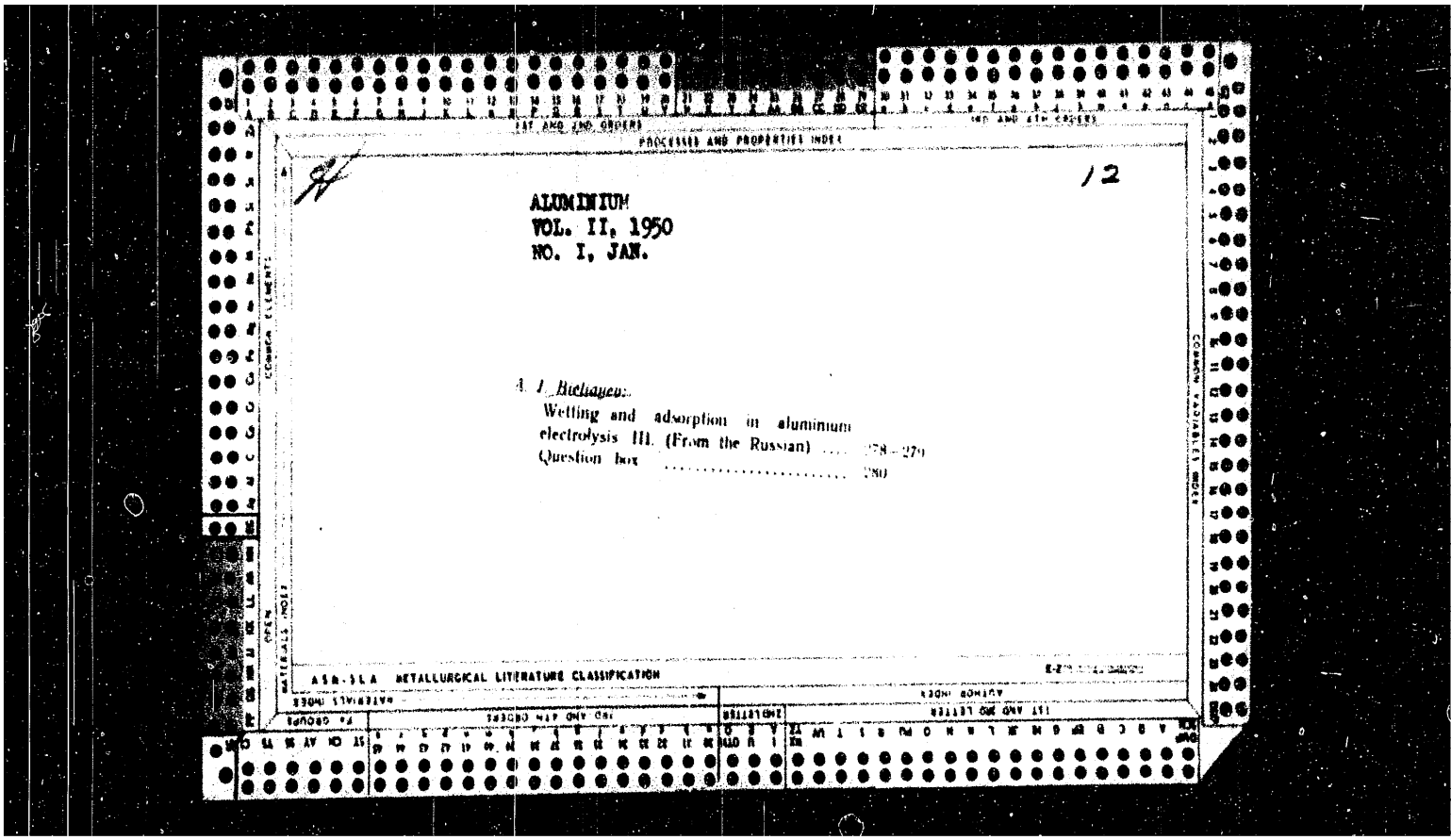

PROCESSES AND PROPERTIES INDEX

12

ALUMINIUM
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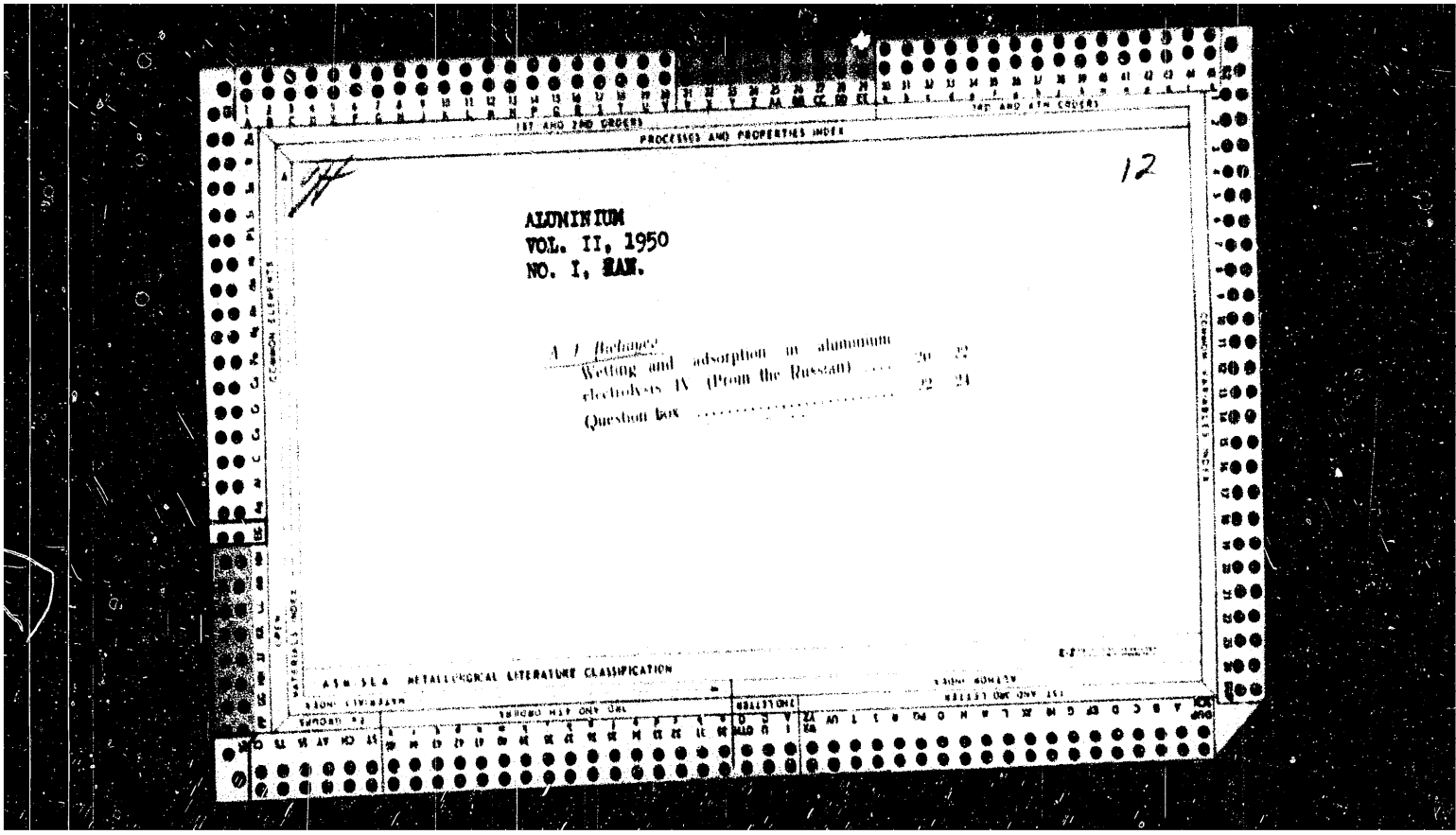

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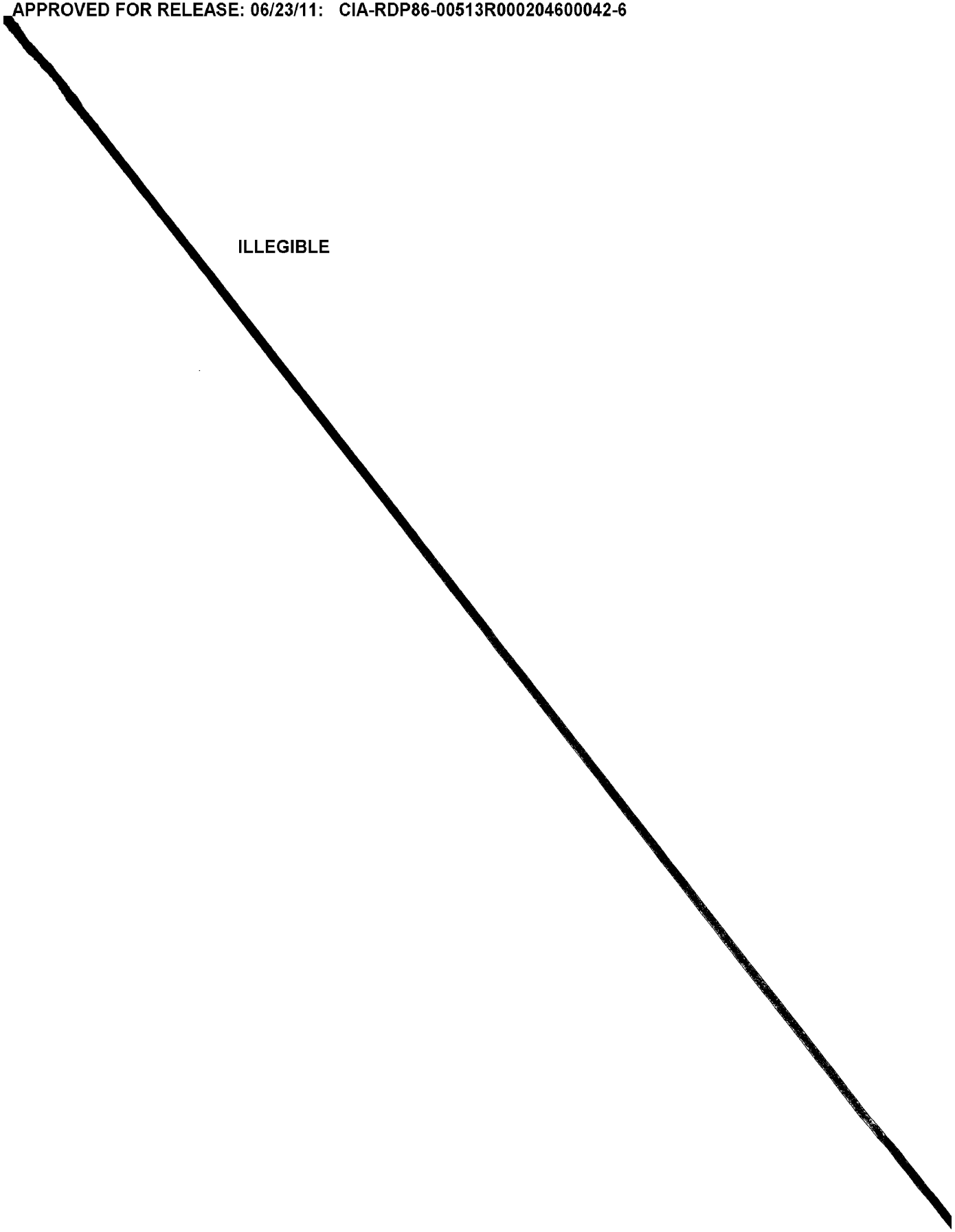


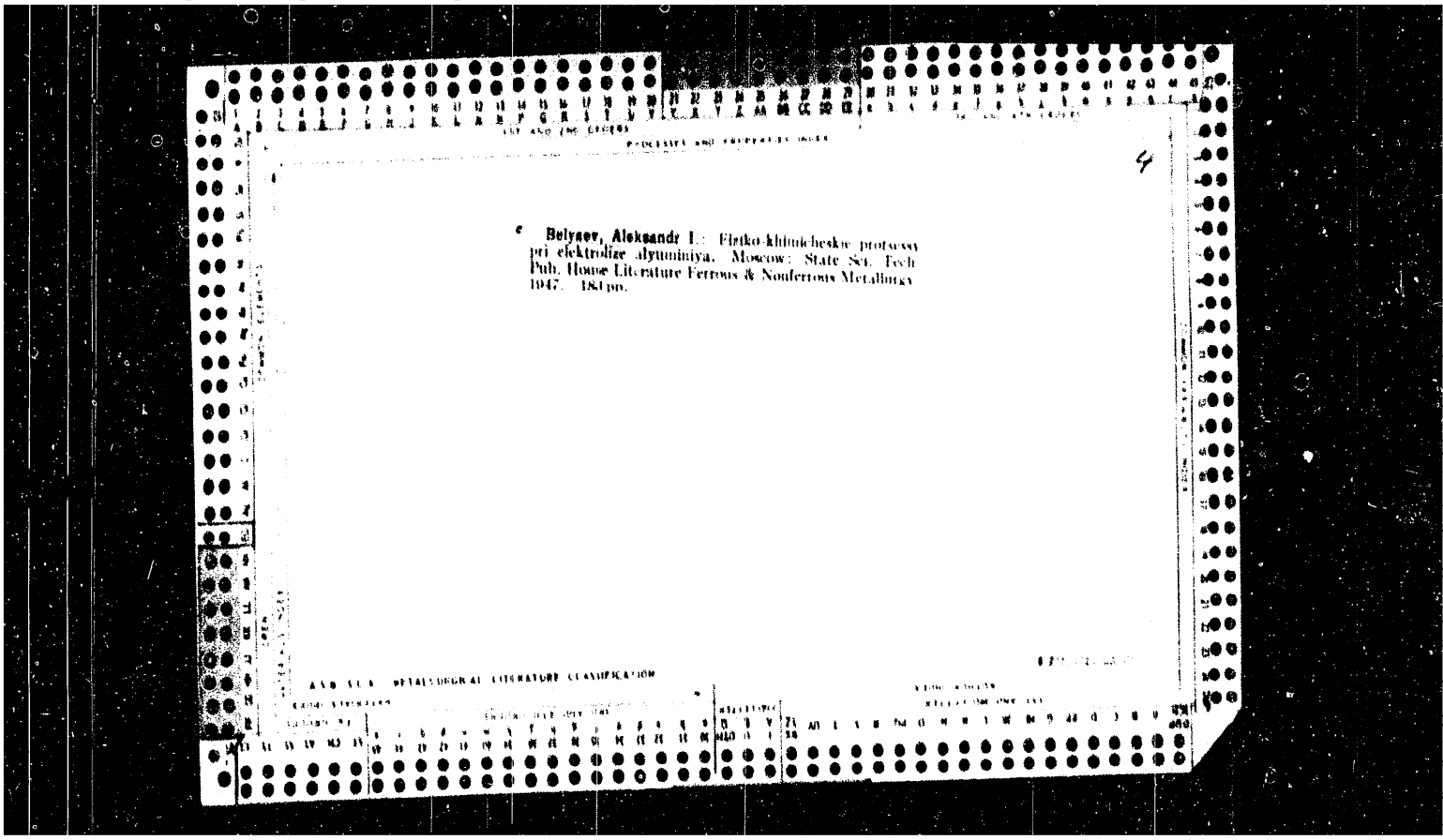
BELYAYEV, A.I

25124. BELYAYEV, A. I. Vyyavlyenie Rabotosposobnosti U Plemennykh Tabunnykh Loshadey. Konevodstvo. 1949. No. 4, C. 23-29

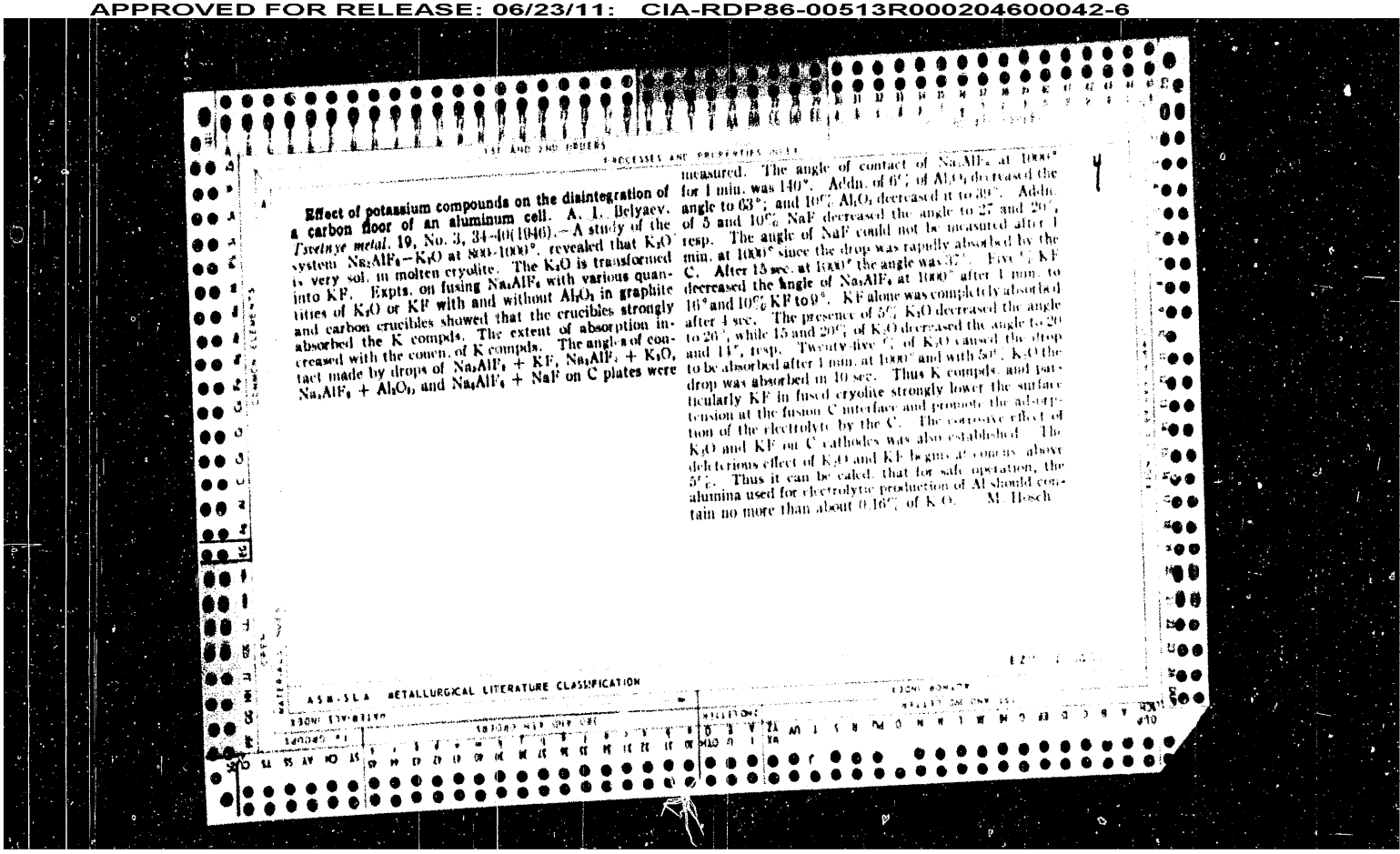
SO: Letopis' No. 33, 1949

BELYAYEV, A. I.

"Metallurgy of Light Metals," third edition, Moscow, 1949. 428 pages.



Belyaev, Aleksandr I.: Fiziko-khimicheskie protsessy pri elektrolize alyuminiya. Moscow: State Sci. Tech Pub. House Literature Ferrous & Nonferrous Metallurgy 1947. 184 pp.



Effect of potassium compounds on the disintegration of a carbon floor of an aluminum cell. A. I. Belyaev, *Tsvetnye metal.* **19**, No. 3, 34–40(1946).—A study of the system Na_3AlF_6–K_2O at 800–1000°, revealed that K_2O is very sol. in molten cryolite. The K_2O is transformed into KF. Expts. on fusing Na_3AlF_6 with various quantities of K_2O or KF with and without Al_2O_3 in graphite and carbon crucibles showed that the crucibles strongly absorbed the K compds. The extent of absorption increased with the concn. of K compds. The angles of contact made by drops of Na_3AlF_6 + KF, Na_3AlF_6 + K_2O, Na_3AlF_6 + Al_2O_3, and Na_3AlF_6 + NaF on C plates were measured. The angle of contact of Na_3AlF_6 at 1000° for 1 min. was 140°. Addn. of 6% of Al_2O_3 decreased the angle to 63°; and 10% Al_2O_3 decreased it to 39°. Addn. of 5 and 10% NaF decreased the angle to 27 and 20°, resp. The angle of NaF could not be measured after 1 min. at 1000° since the drop was rapidly absorbed by the C. After 15 sec. at 1000° the angle was 37°. Five % KF decreased the angle of Na_3AlF_6 at 1000° after 1 min. to 16° and 10% KF to 9°. KF alone was completely absorbed after 4 sec. The presence of 5% K_2O decreased the angle to 20°, while 15 and 20% of K_2O decreased the angle to 20 and 14°, resp. Twenty-five % of K_2O caused the drop to be absorbed after 1 min. at 1000° and with 50% K_2O the drop was absorbed in 10 sec. Thus K compds. and particularly KF in fused cryolite strongly lower the surface tension at the fusion C interface and promote the adsorption of the electrolyte by the C. The corrosive effect of K_2O and KF on C cathodes was also established. The deleterious effect of K_2O and KF begins at concns. above 5%. Thus it can be asked, that for safe operation, the alumina used for electrolytic production of Al should contain no more than about 0.16% of K_2O. M. Hesch

BELYAEV, Aleksandr Ivanovich, 1902-

The Metallurgy of light metals. Moskva, Gos. nauchn.-tekhn. izd-vo lit-ry po chernoi i tsvetnoi metalurgii, 1944. 543 p. (49-55391)

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BELYAEV, Aleksandr Ivanovich,

Work on aluminium vats. Moskva, Metallurgizdat, 1943. 58 p. (V pomoshch' rabochim massovykh professii) (48-30843)

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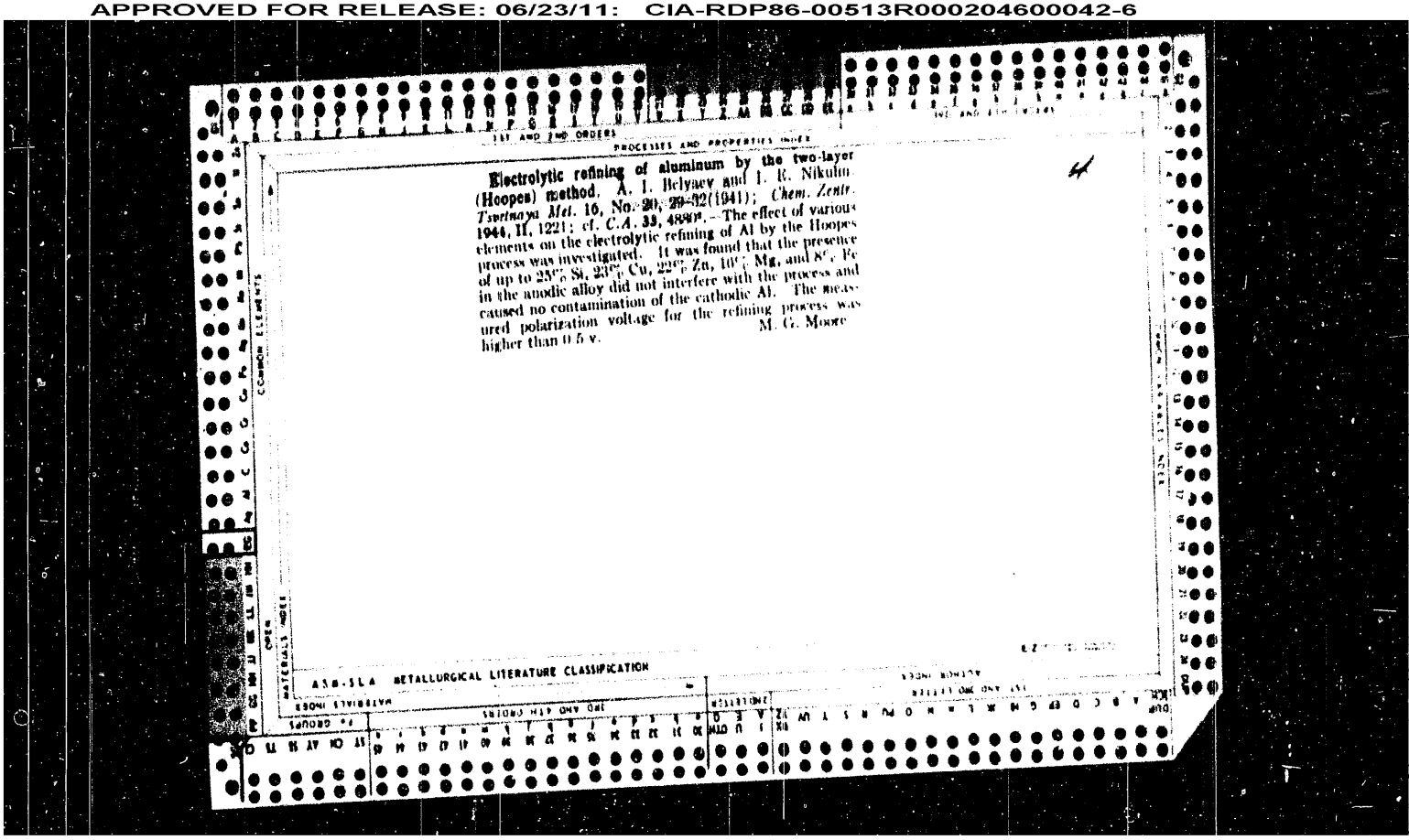
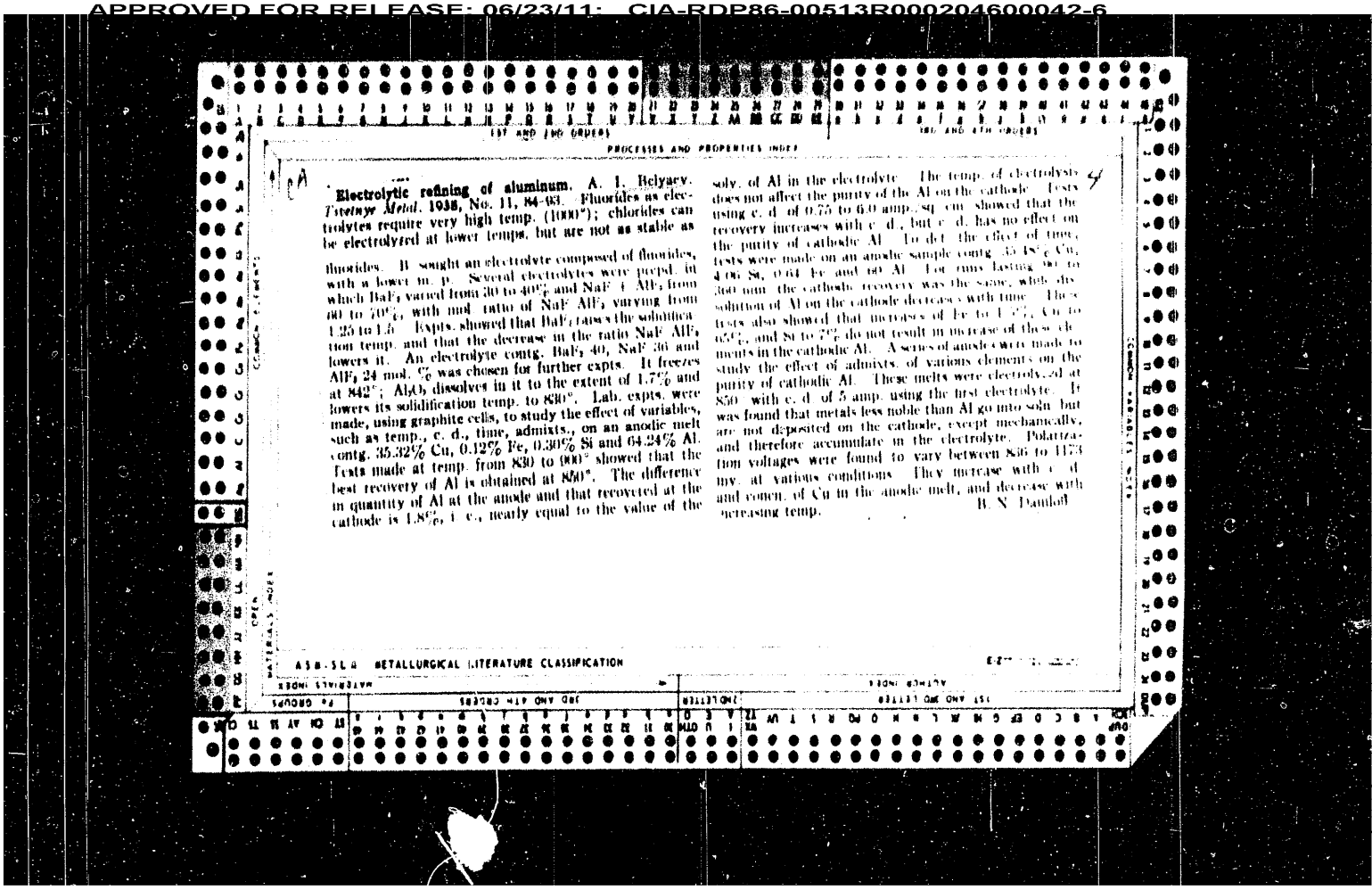


Electrolytic refining of aluminum by the two-layer (Hoopes) method. A. I. Belyaev and I. R. Nikulin. *Tsvetnaya Met.* 16, No. 20, 29–32(1941); *Chem. Zentr.* 1944, II, 1221; cf. *C.A.* 33, 4849⁹. – The effect of various elements on the electrolytic refining of Al by the Hoopes process was investigated. It was found that the presence of up to 25% Si, 23% Cu, 22% Zn, 10% Mg, and 8% Fe in the anodic alloy did not interfere with the process and caused no contamination of the cathodic Al. The measured polarization voltage for the refining process was higher than 0.5 v.

M. G. Moore

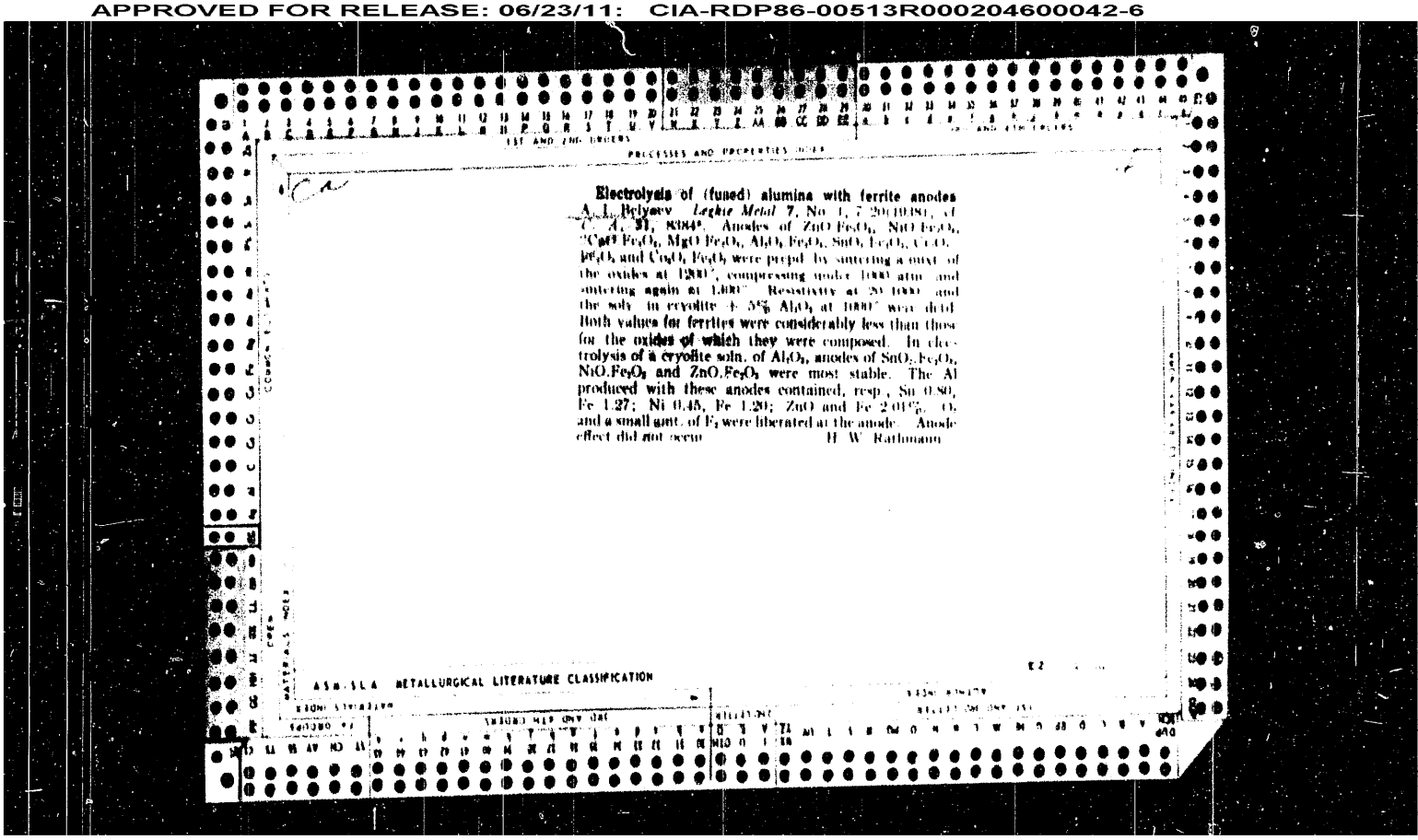
Bolyaev, A. I. *The Metallurgy of the Light Metals.* [In Russian.] Pp. 496.
1940. Moscow and Leningrad: Metallurgizdat. (15 Rbl.)



PROCESSES AND PROPERTIES INDEX

Electrolytic refining of aluminum. A. I. Belyaev. *Tsvetnye Metal.* 1938, No. 11, 84-93. Fluorides as electrolytes require very high temp. (1000°); chlorides can be electrolyzed at lower temps. but are not as stable as fluorides. B sought an electrolyte composed of fluorides, with a lower m. p. Several electrolytes were prepd. in which BaF_2 varied from 30 to 40% and NaF + AlF_3 from 60 to 70%, with mol. ratio of NaF: AlF_3 varying from 1.25 to 1.5. Expts. showed that BaF_2 raises the solidification temp. and that the decrease in the ratio NaF: AlF_3 lowers it. An electrolyte contg. BaF_2 40, NaF 36 and AlF_3 24 mol. % was chosen for further expts. It freezes at 842°; Al_2O_3 dissolves in it to the extent of 1.7% and lowers its solidification temp. to 830°. Lab. expts. were made, using graphite cells, to study the effect of variables, such as temp., c. d., time, admixts., on an anodic melt contg. 35.32% Cu, 0.12% Fe, 0.30% Si and 64.24% Al. Tests made at temp. from 830 to 900° showed that the best recovery of Al is obtained at 850°. The difference in quantity of Al at the anode and that recovered at the cathode is 1.8%, i. e., nearly equal to the value of the soly. of Al in the electrolyte. The temp. of electrolysis does not affect the purity of the Al on the cathode. Tests using c. d. of 0.75 to 6.0 amp./sq. cm. showed that the recovery increases with c. d., but c. d. has no effect on the purity of cathodic Al. To det. the effect of time, tests were made on an anodic sample contg. 35.48% Cu, 0.06 Si, 0.61 Fe and 60 Al. For runs lasting 30 to 300 min. the cathodic recovery was the same, while dissolution of Al on the cathode decreases with time. These tests also showed that increases of Fe to 1.5%, Cu to 0.5%, and Si to 7% do not result in increase of these elements in the cathodic Al. A series of anodic melts was made to study the effect of admixts. of various elements on the purity of cathodic Al. These melts were electrolyzed at 850° with c. d. of 5 amp. using the first electrolyte. It was found that metals less noble than Al go into soln. but are not deposited on the cathode, except mechanically, and therefore accumulate in the electrolyte. Polarization voltages were found to vary between 836 to 1173 mv. at various conditions. They increase with c. d. and concn. of Cu in the anodic melt, and decrease with increasing temp. B. N. Dambol

A.S.M.-S.L.A. METALLURGICAL LITERATURE CLASSIFICATION



Electrolysis of (fused) alumina with ferrite anodes A. I. Belyaev *Legkie Metal* 7, No. 1, 7-20(1938); cf. *C. A.* **31**, 8304⁸. Anodes of $ZnO.Fe_2O_3$, $NiO.Fe_2O_3$, $CaO.Fe_2O_3$, $MgO.Fe_2O_3$, $Al_2O_3.Fe_2O_3$, $SnO.Fe_2O_3$, $CuO.Fe_2O_3$ and $Cu_2O.Fe_2O_3$ were prepd. by sintering a mixt. of the oxides at 1200°, compressing under 1000 atm. and sintering again at 1400°. Resistivity at 20-1000° and the solv. in cryolite + 5% Al_2O_3 at 1000° were detd. Both values for ferrites were considerably less than those for the oxides of which they were composed. In electrolysis of a cryolite soln. of Al_2O_3, anodes of $SnO.Fe_2O_3$, $NiO.Fe_2O_3$ and $ZnO.Fe_2O_3$ were most stable. The Al produced with these anodes contained, resp., Sn 0.80, Fe 1.27; Ni 0.45, Fe 1.20; ZnO and Fe 2.01%. O and a small amt. of F_2 were liberated at the anode. Anode effect did not occur. H. W. Rathmann

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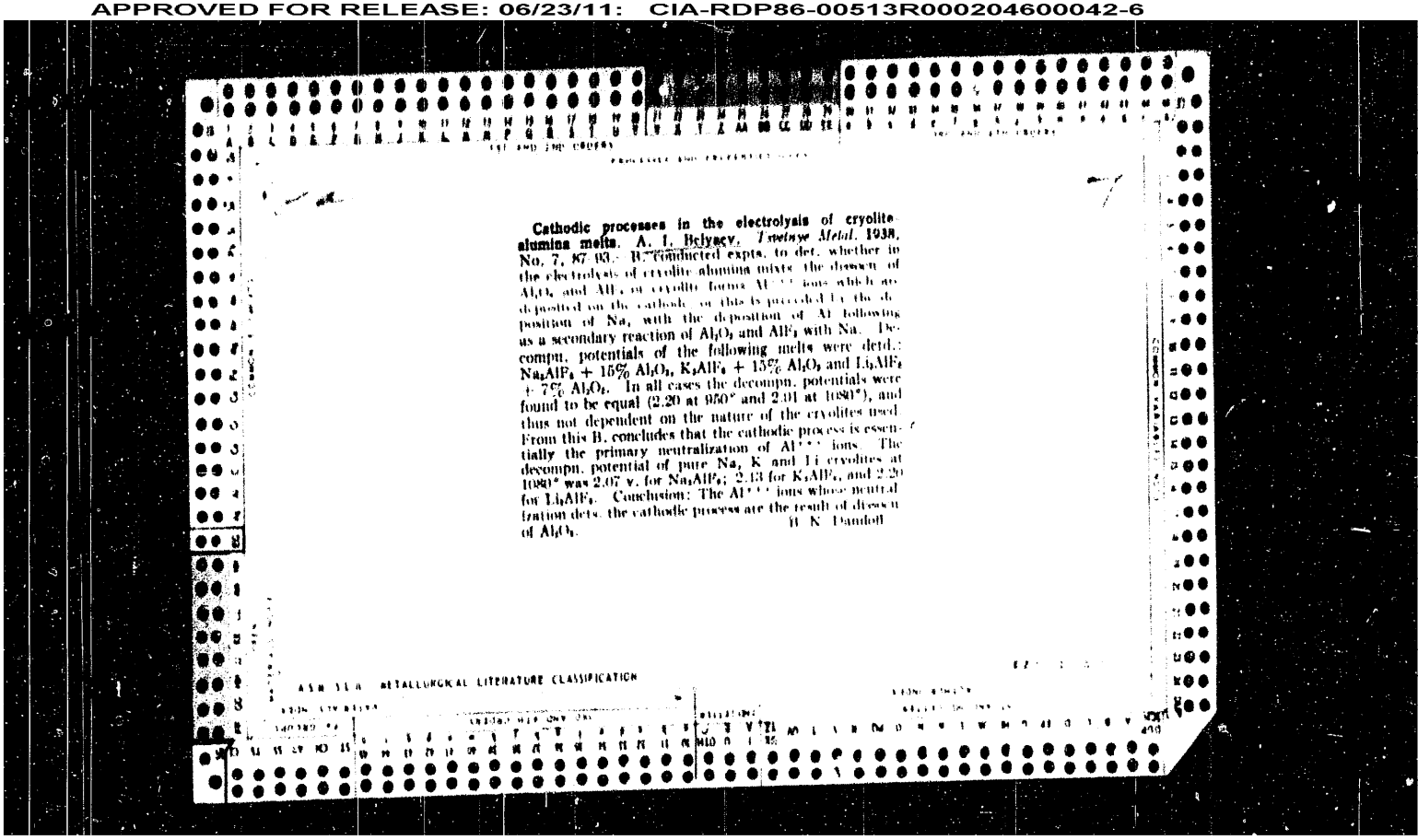

Cathodic processes in the electrolysis of cryolite-alumina melts. A. I. Belyaev. *Tsvetnye Metal.* 1938, No. 7, 87-93.- B. conducted expts. to det. whether in the electrolysis of cryolite-alumina mixts. the dissocn. of Al_2O_3 and AlF_3 in cryolite forms Al^{+++} ions which are deposited on the cathode or this is preceded by the deposition of Na, with the deposition of Al following as a secondary reaction of Al_2O_3 and AlF_3 with Na. Decompn. potentials of the following melts were detd.: Na_3AlF_6 + 15% Al_2O_3, K_3AlF_6 + 15% Al_2O_3 and Li_3AlF_6 + 7% Al_2O_3. In all cases the decompn. potentials were found to be equal (2.20 at 950° and 2.01 at 1080°), and thus not dependent on the nature of the cryolites used. From this B. concludes that the cathodic process is essentially the primary neutralization of Al^{+++} ions. The decompn. potential of pure Na, K and Li cryolites at 1080° was 2.07 v. for Na_3AlF_6; 2.13 for K_3AlF_6, and 2.20 for Li_3AlF_6. Conclusion: The Al^{+++} ions whose neutralization dets. the cathodic process are the result of dissocn of Al_2O_3.

H. N. Dandoff

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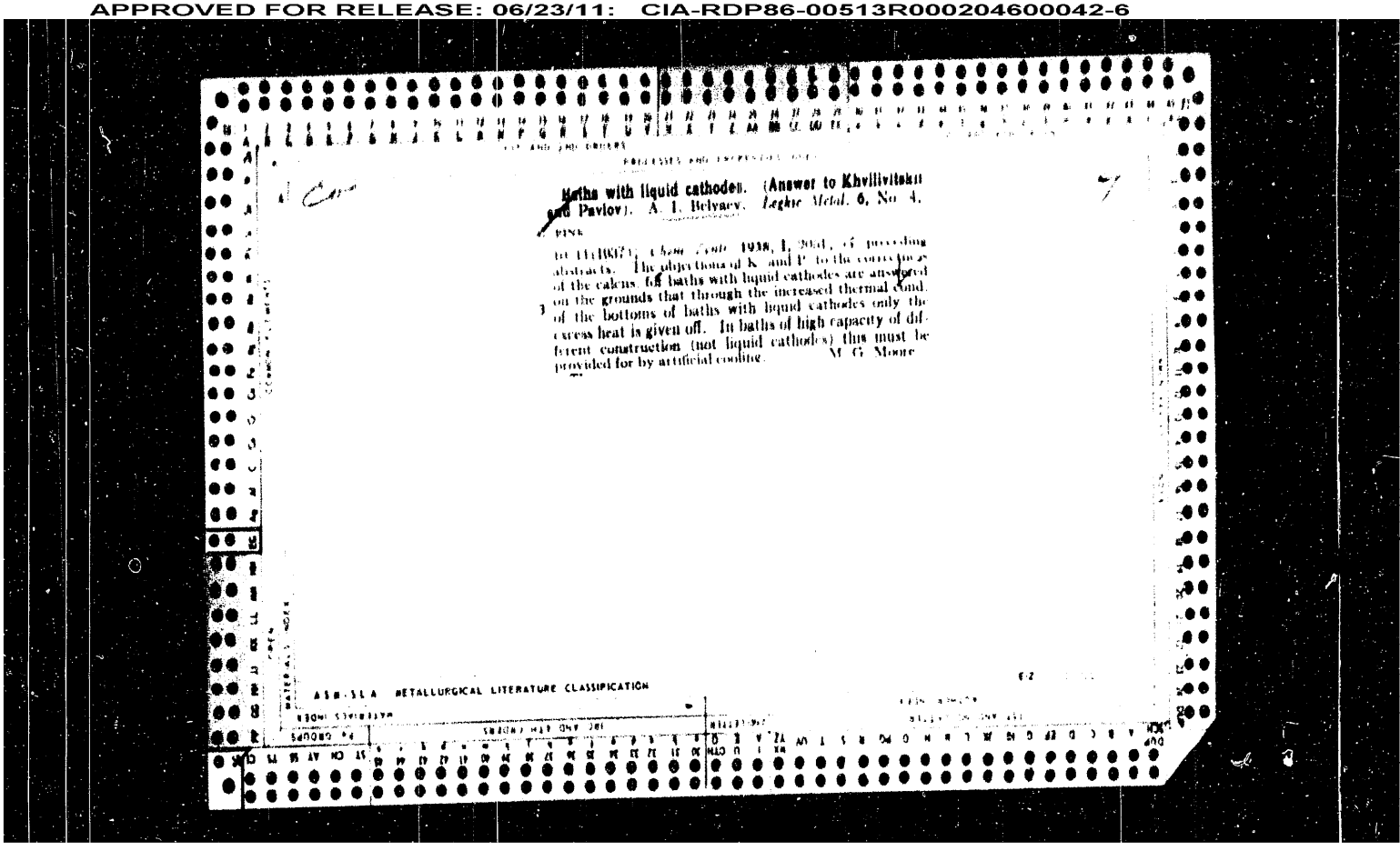

Baths with liquid cathodes. (Answer to Khvilivitskii and Pavlov). A. I. Belyaev. *Legkie Metal.* 6, No. 4,

[illegible]

to [illegible], *Chem. Zentr.* 1938, I, 2051, of preceding abstracts. The objections of K. and P. to the correctness of the calcns. for baths with liquid cathodes are answered on the grounds that through the increased thermal cond. of the bottoms of baths with liquid cathodes only the excess heat is given off. In baths of high capacity of different construction (not liquid cathodes) this must be provided for by artificial cooling. M. G. Moore

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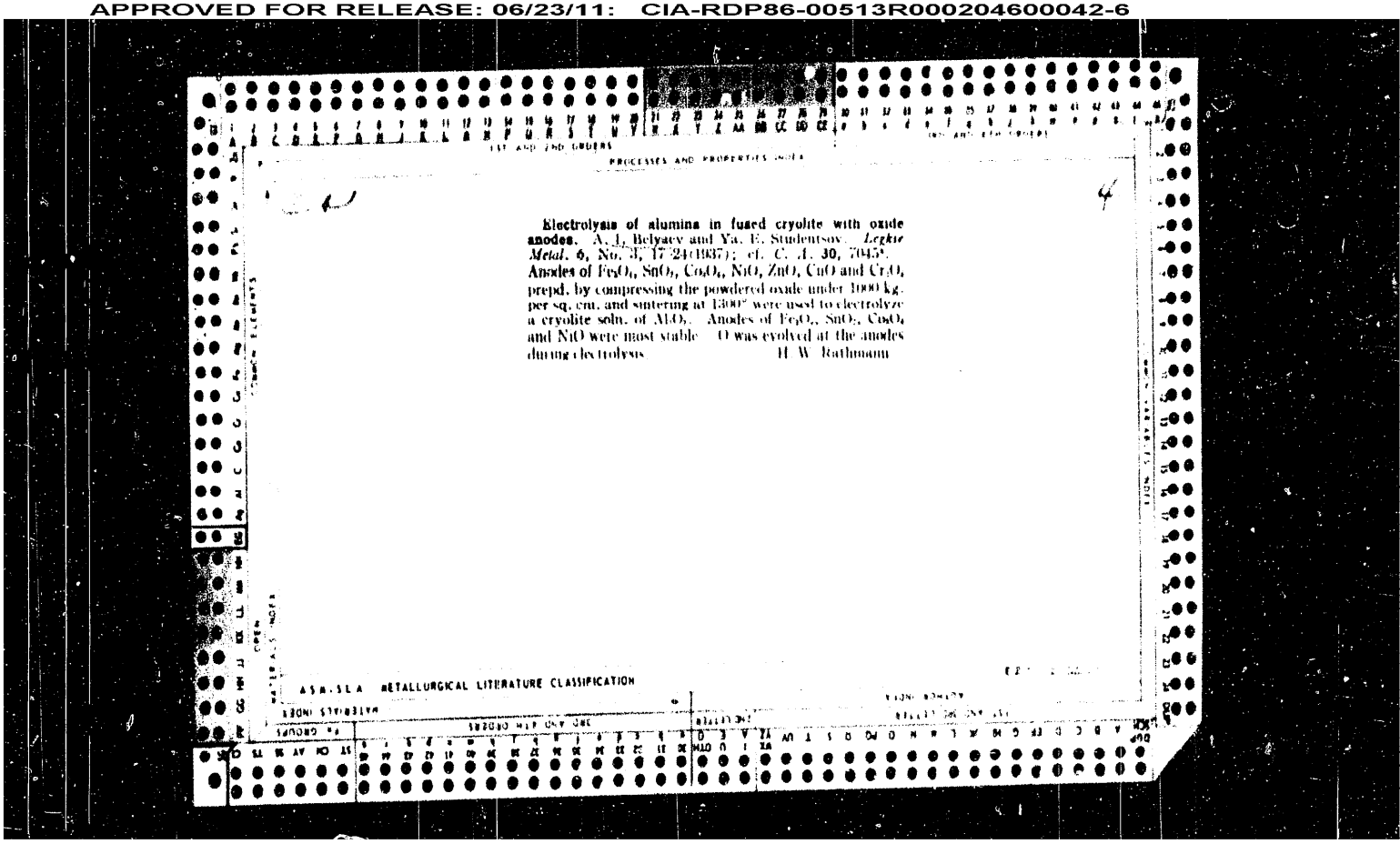

PROCESSES AND PROPERTIES INDEX

Electrolysis of alumina in fused cryolite with oxide anodes. A. I. Belyaev and Ya. E. Studentsov. *Legkie Metal.* **6**, No. 3, 17-24 (1937); cf. *C. A.* **30**, 7045⁸. Anodes of Fe_2O_3, SnO_2, Co_3O_4, NiO, ZnO, CuO and Cr_2O_3 prepd. by compressing the powdered oxide under 1000 kg. per sq. cm. and sintering at 1300° were used to electrolyze a cryolite soln. of Al_2O_3. Anodes of Fe_2O_3, SnO_2, Co_3O_4 and NiO were most stable. O was evolved at the anodes during electrolysis. H. W. Rathmann

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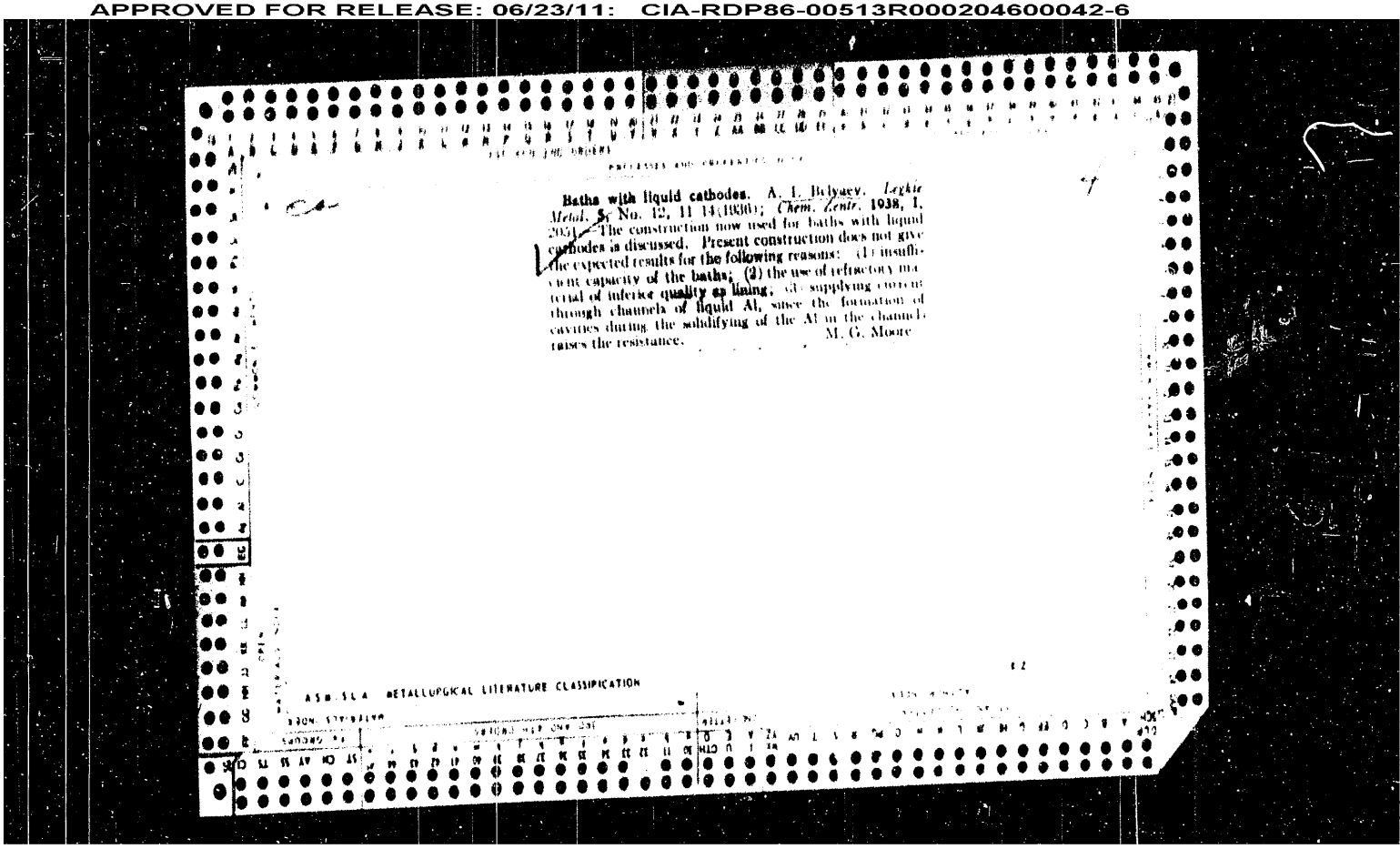
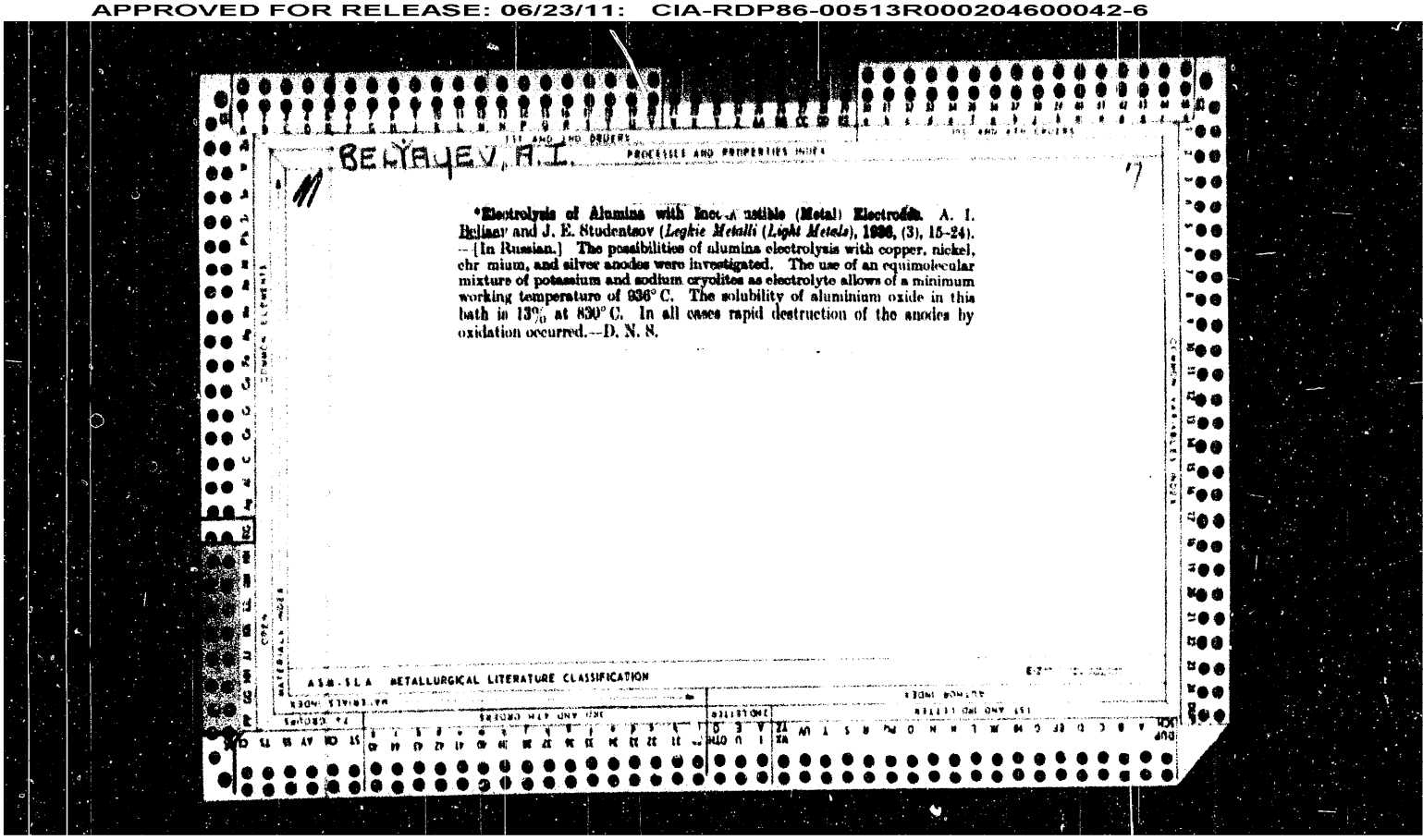


Baths with liquid cathodes. A. I. Bulyaev. *Legkie Metal.* **7**, No. 12, 11-14(1938); *Chem. Zentr.* 1938, I, 2051.—The construction now used for baths with liquid cathodes is discussed. Present construction does not give the expected results for the following reasons: (1) insufficient capacity of the baths; (2) the use of refractory material of inferior quality as lining; (3) supplying current through channels of liquid Al, since the formation of cavities during the solidifying of the Al in the channels raises the resistance. M. G. Moore



BELYAYEV, A. I.

***Electrolysis of Alumina with Inc[illegible]stible (Metal) Electrodes.** A. I. Belinav and J. E. Studentsov (*Legkie Metalli* (*Light Metals*), 1936, (3), 15-24). —[In Russian.] The possibilities of alumina electrolysis with copper, nickel, chr mium, and silver anodes were investigated. The use of an equimolecular mixture of potassium and sodium cryolites as electrolyte allows of a minimum working temperature of 936° C. The solubility of aluminium oxide in this bath is 13% at 830° C. In all cases rapid destruction of the anodes by oxidation occurred.—D. N. S.

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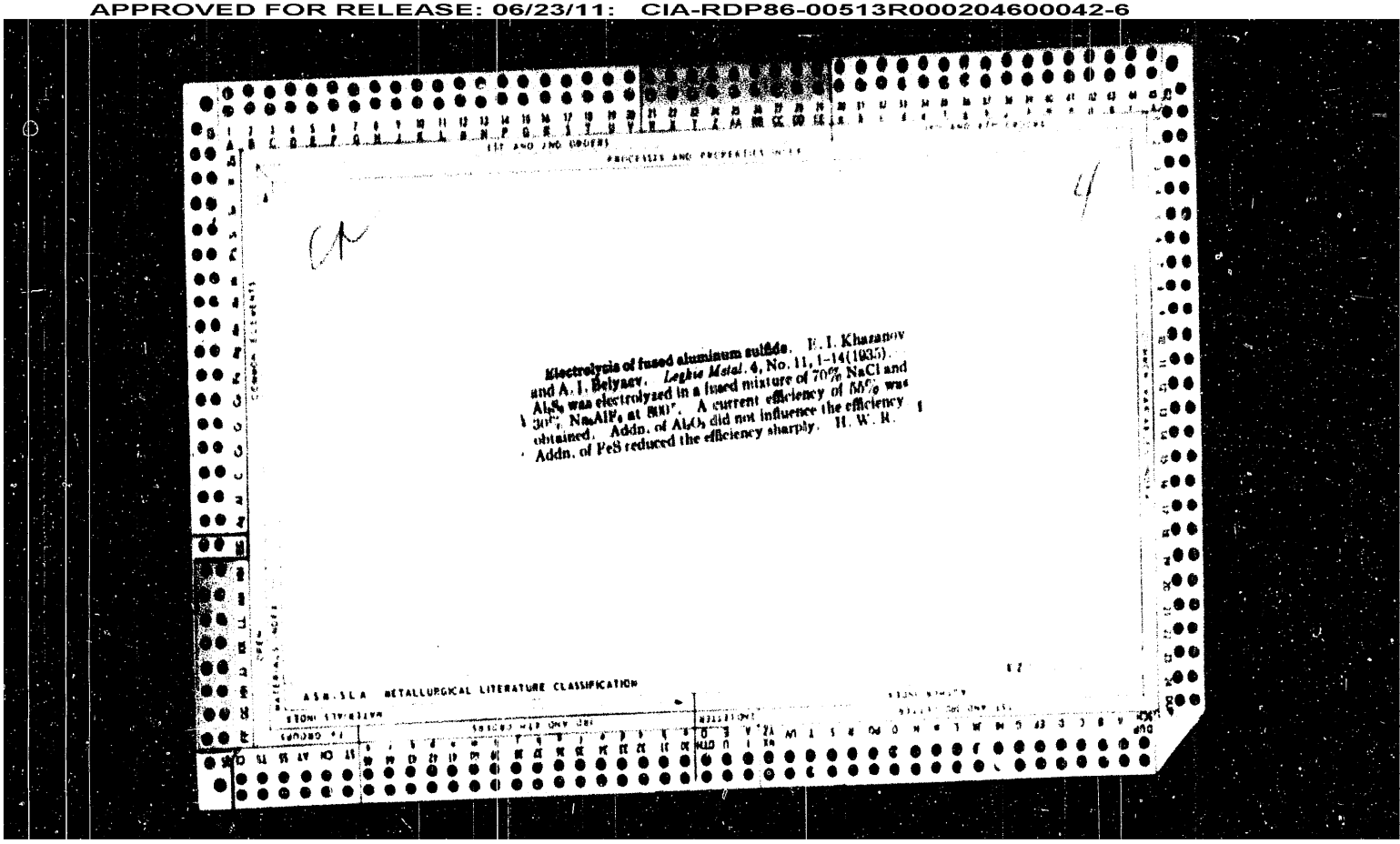

Electrolysis of fused aluminum sulfide. F. I. Khazanov and A. I. Belyaev. *Legkie Metal.* 4, No. 11, 1–14(1935). Al_2S_3 was electrolyzed in a fused mixture of 70% NaCl and 30% Na_3AlF_6 at 800°. A current efficiency of 58% was obtained. Addn. of Al_2O_3 did not influence the efficiency. Addn. of FeS reduced the efficiency sharply. H. W. R.

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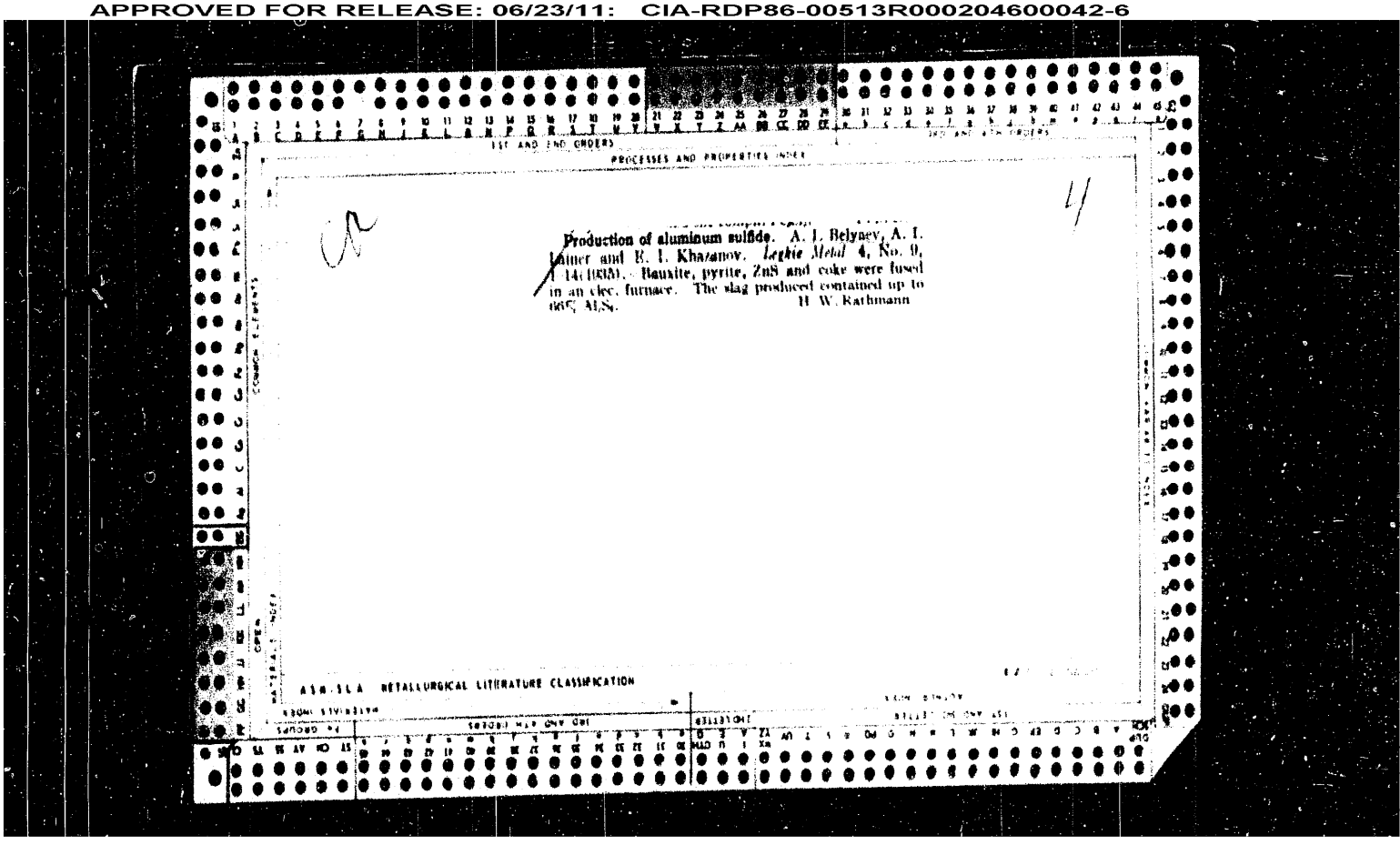

PROCESSES AND PROPERTIES INDEX

Production of aluminum sulfide. A. I. Belyaev, A. I. Lainer and R. I. Khazanov. *Legkie Metal* 4, No. 9, 14 (1935). Bauxite, pyrite, ZnS and coke were fused in an elec. furnace. The slag produced contained up to 66% Al_2S_3.
H. W. Rathmann

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

Deceased

KOMAROV, N.M., prof.; GROMYKHIN, P.S., kand.veterinarnykh nauk;
BELYAYEV, A.I., veterinarnyy vrach [deceased]

Free maintenance of dairy cows without stalls. Trudy VIEV 26:
236-249 '62. (MIRA 16:2)

1. Laboratoriya zoogigiyeny Vsesoyuznogo instituta eksperimental'-
noy veterinarii.

(Dairy cattle)

BELYAYEV, A.G., inzh.

Reconditioning of cylinder jackets of the M753 diesel engines.
Mashinostroenie no.2:102 Mr-Ap '65. (MIRA 18:6)

RUDKOV, G.V.; BELYAYEV, A.G.

Our method for reconditioning the jacket of M753 diesel engine cylinders. Elek. i tepl.tiaga 7 no.11:17 N '63. (MIRA 17:2)

1. Zamestitel' nachal'nika Kustovogo proyektno-tekhnologicheskogo otdela po remontu i ekspluatatsii teplovozov pri zavode im. Il'icha, Zhdanov (for Rudkov). 2. Starshiy inzh. Kustovogo proyektno-tekhnologicheskogo otdela po remontu i ekspluatatsii teplovozov pri zavode im. Il'icha, Zhdanov (for Belyayev).

ACC NR: AP7000642

oxidizer particle size. The experimental results were in good agreement with the idea that β is determined by the temperature (T_b) in the combustion zone region which determines the burning velocity; if T_b is large, β is small and vice versa. Orig. art. has: 5 figures and 7 tables.

[W. A. 68]
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combustion proceeded upward. Combustion time was measured with a piezoelectric pickup. To record accurately combustion completion, a small amount of fast-burning potassium picrate was placed at the upper end of

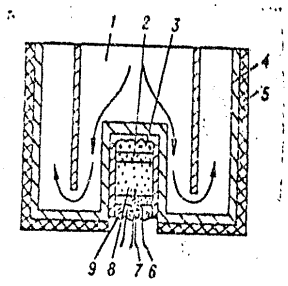

Fig. 1. Charge heating

1 - Hot-air stream; 2 - potassium picrate; 3 - thermal insulation; 4 - body of heater (stainless steel); 5 - thermal insulation (asbestos); 6 - spiral for ignition; 7 - thermocouple; 8 - charge; 9 - igniting composition.

the charge. The data given in tabular and graphic form involve T_0 values from -65 to 200C, combustion temperatures from 1500 to 2900K, and pressures from 1 to 100 atm. It was found that in all cases u is monotonic increasing with T_0. The dependence $u(T_0)$ was conveniently characterized by the temperature coefficient $\beta = d\ln u/dT_0$. β was highly dependent on the fuel/oxidizer ratio (α). The curve $\beta(\alpha)$ had a minimum whose position corresponded to that of the burning velocity peak. For mixture compositions not too far from stoichiometric, β increased with

ACC NR: AP7000642 SOURCE CODE: UR/0414/66/000/003/0059/0066

AUTHOR: Lukashenya, G. V. (Moscow); Malinenko, G. M. (Moscow); Bakhman, N. N. (Moscow); Belyayev, A. F. (Moscow)

ORG: none

TITLE: Temperature coefficient of burning velocity in condensed mixtures at various component ratios

SOURCE: Fizika goreniya i vzryva, no. 3, 1966, 59-66

TOPIC TAGS: ammonium perchlorate, rocket propellant, solid propellant, composite propellant, propellant, solid propellant combustion, temperature coefficient, burning velocity, perchlorate, ammonium compound, combustion temperature

ABSTRACT: A study has been made of the initial temperature (T_0) dependence of the burning velocity (u) for model mixtures of ammonium perchlorate (AP) with polystyrene (PS), poly(methyl methacrylate) (PMM), polyoxymethylene, or bitumen. Powder samples were mixed and compacted in brass shells to a density close to the maximum. Jellied mixtures were also prepared for AP+PS and AP+PMM mixtures. The experiments were conducted in a constant-pressure bomb under nitrogen as shown in Fig. 1. The charge was placed in the pocket of the hot-air heater. A thermocouple was glued to the bottom end of the charge. The charge was ignited by means of an incandescent wire from the bottom so that

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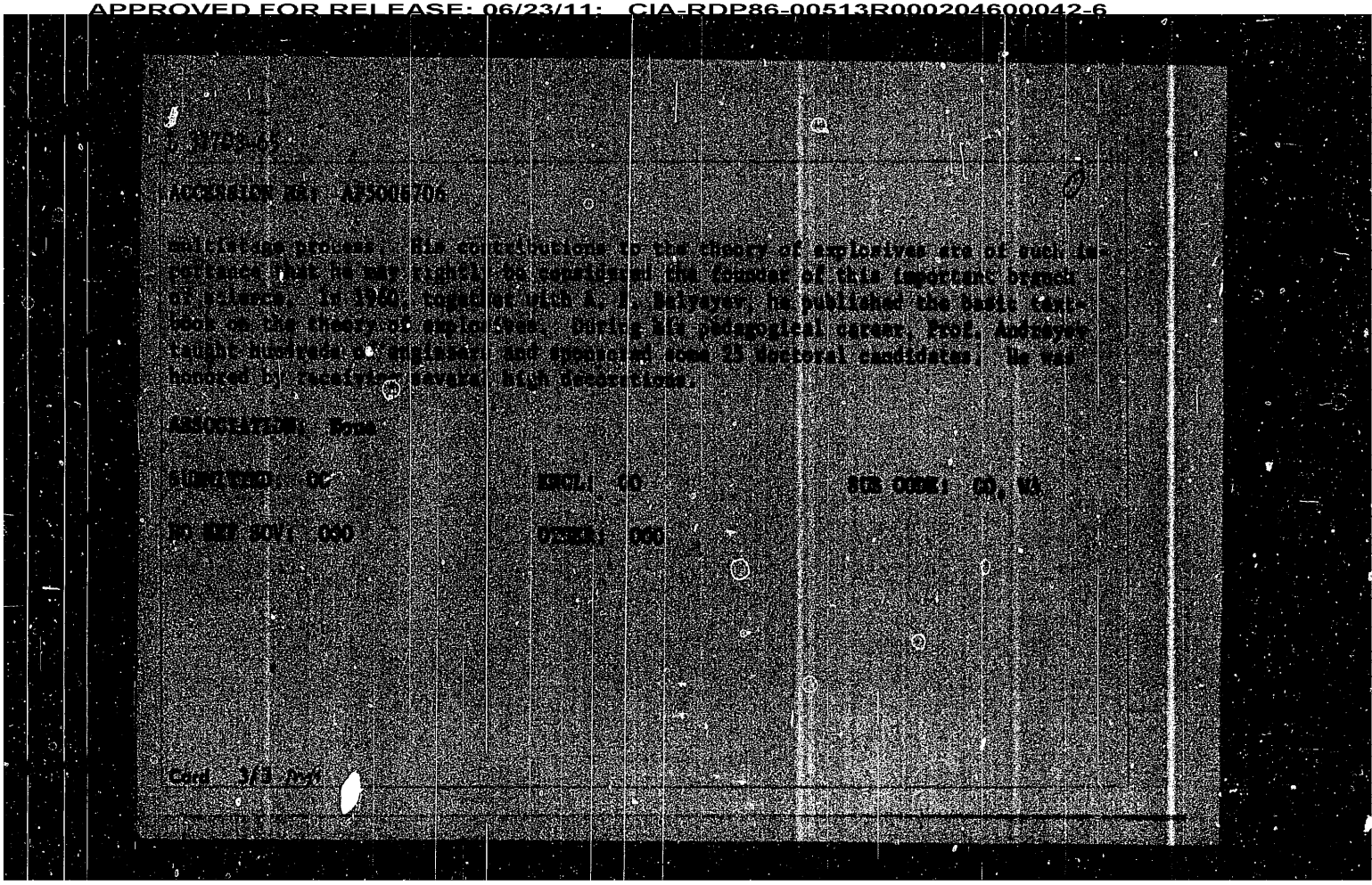

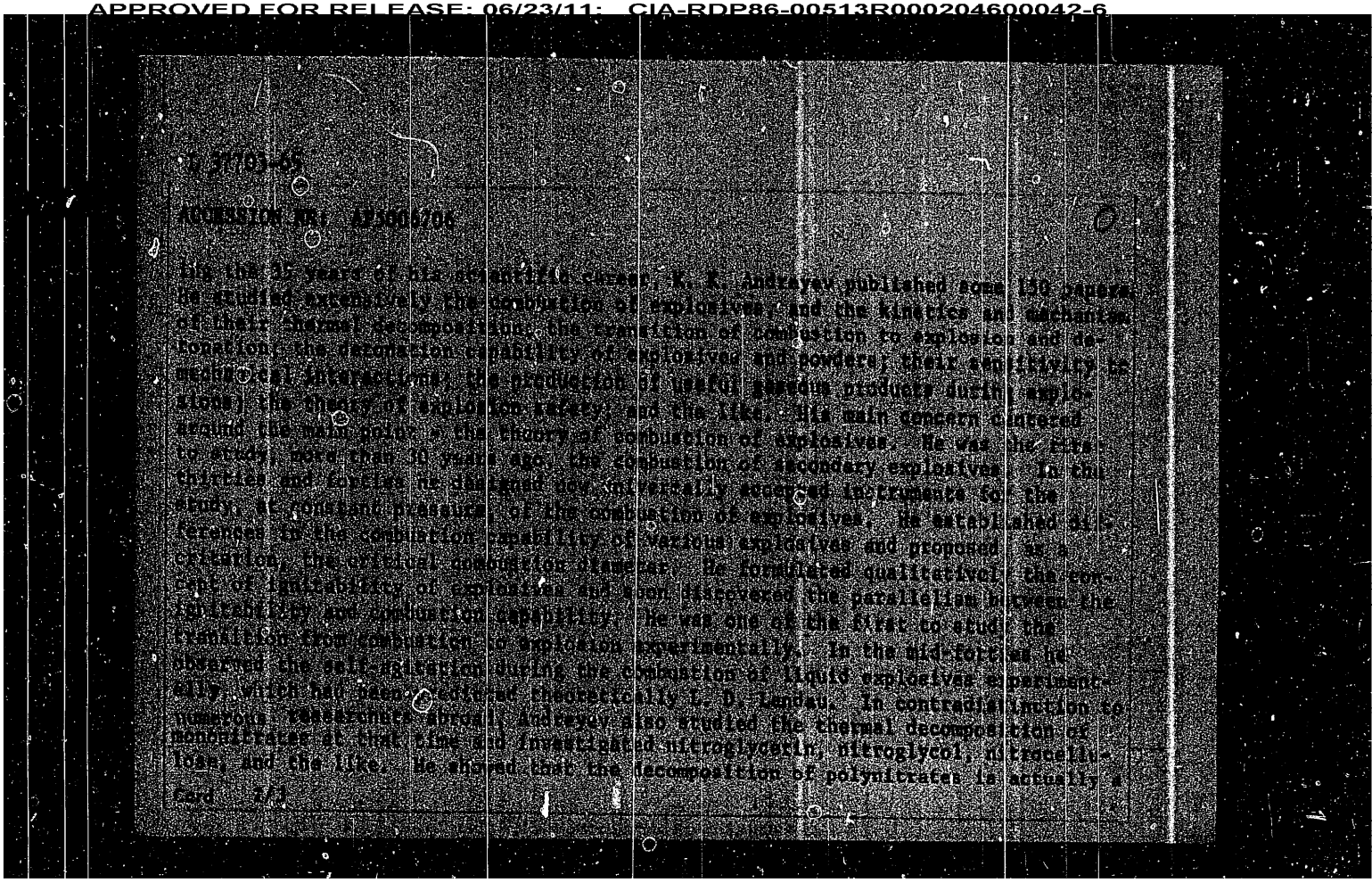

L 27703-65

ACCESSION NR: AP5006706

For the 45 years of his scientific career, K. K. Andreyev published some 150 papers. He studied extensively the combustion of explosives, and the kinetics and mechanism of their thermal decomposition, the transition of combustion to explosion and detonation, the detonation capability of explosives and powders, their sensitivity to mechanical interactions, the production of useful gaseous products during explosions, the theory of explosion safety, and the like. His main concern centered around the main point - the theory of combustion of explosives. He was the first to study, more than 30 years ago, the combustion of secondary explosives. In the thirties and forties he challenged new, universally accepted instruments for the study of nonsteady processes of the combustion of explosives. He established differences in the combustion capability of various explosives and proposed, as a criterion, the critical combustion diameter. He formulated quantitatively the concept of ignitability of explosives and also discovered the parallelism between the ignitability and combustion capability. He was one of the first to study the transition from combustion to explosion experimentally. In the mid-forties he observed the self-ignition during the combustion of liquid explosives experimentally, which had been considered theoretically L. D. Landau. In contradistinction to numerous researchers abroad, Andreyev also studied the thermal decomposition of nonnitrated at that time and investigated nitroglycerin, nitroglycol, nitrocellulose, and the like. He showed that the decomposition of polynitrates is actually a

Card 2/3

L 37703-65

ACCESSION NR: AP5006706 S/0076/65/039/002/0534/0536

AUTHORS: Zel'dovich, Ya. B.; Semenov, N. N.; Khariton, Yu. B.; Belyayev, A. F.; Obmenin, A. V.; Kondrat'yev, V. N.; Frolov, Ye. Yu.; Svetlov, B. S.

TITLE: Obituary of Konstantin Konstantinovich Andreyev

SOURCE: Zhurnal fizicheskoy khimii, v. 39, no. 2, 1965, 534-536

TOPIC TAGS: explosion theory, explosive combustion, detonation, critical combustion diameter, nitro derivative

ABSTRACT: Konstantin Konstantinovich Andreyev, Doctor of Engineering Sciences, died on 5 May 1964. Son of a physician, he was born in February 1903. Prior to his graduation in 1929 from the Khimicheskiy fakul'tet Moskovskogo vysshego tekhnicheskogo uchilishcha (Chemical Faculty of the Moscow Higher Technical School), he spent approximately one year at the Physical Chemistry Institute of Berlin University under the guidance of the well known German physical chemist Prof. P. Gunther. After several years spent at the MVTU, he joined the Institut khimicheskoy fiziki (Institute of Chemical Physics). In February of 1938 he became a professor at and later (1939) head of the Moskovskiy khimiko-tekhnologicheskiy institut im. D. I. Mendeleyeva (Moscow Chemical Engineering Institute). Dur-

Card 1/3

2

gasified by decomposition, pyrolysis, or evaporation, give linear u-vs-p relationships at subatmospheric pressure. The experimental results together with an evaluation of burning velocities at higher pressures, obtained previously, indicate that the following four regions exist: 1) a low-pressure region characterized by a plane flame front up to about 2 atm (D = 1); 2) the region of transition from a plane to a multiflame front with a nonlinear u-vs-p relationship (D < 1) at 2.5—3 to 100—250 atm; 3) a high-pressure region characterized by a multiflame front but with a linear u-vs-p relationship from 100—200 to 1000—1500 atm; and 4 a region above 1500 atm (D< 0.3—0.4). Multiflame fronts consist of flames which propagate along the fuel-oxidizer boundaries into the propellant. Orig. art. has: 6 figures. [PV]

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L 7678-66 EPA/EWT(m)/EWP(f)/FCC/EWP(j)/FCS(f)/EWP(m)/EWA(c)/ETC(m) RPL
WW/JWD/RM
ACC NR: AP5026023 SOURCE CODE: UR/0105/65/000/001/0025/0030

AUTHOR: Belyayev, A. F. 44,55 (Moscow); Kondrashkov, Yu. A. 44,55 (Moscow); Lukashenya, G. V. 44,55 (Moscow); Parfenov, A. K. 44,55 (Moscow); Tsygankov, S. A. 44,55 (Moscow)

ORG: none

TITLE: Flame combustion of model mixtures of oxidizer with fuel

SOURCE: Nauchno-tekhnicheskiye problemy goreniya i vzryva, no. 1, 1965, 25-30

TOPIC TAGS: propellant, solid propellant 11, combustion 23,44,55, composite propellant, burning velocity

ABSTRACT: The relationship between the burning velocity (u) and pressure (p) of composite propellants has been studied at subatomic pressure. Ammonium perchlorate-trotyl, potassium perchlorate-trotyl, ammonium perchlorace-asphalt, ammonium perchlorate-paraformaldehyde, and ammonium perchlorate-polystyrene were ground to 20 to 40 μ and intensively mixed and compacted to 98% of the maximum density. Although the propellants had different fuels, oxidizers, and polymer binders, the u-vs-p relationships were linear. Therefore, it appears that systems which contain sufficiently fine components and a fuel which can be

Card 1/2

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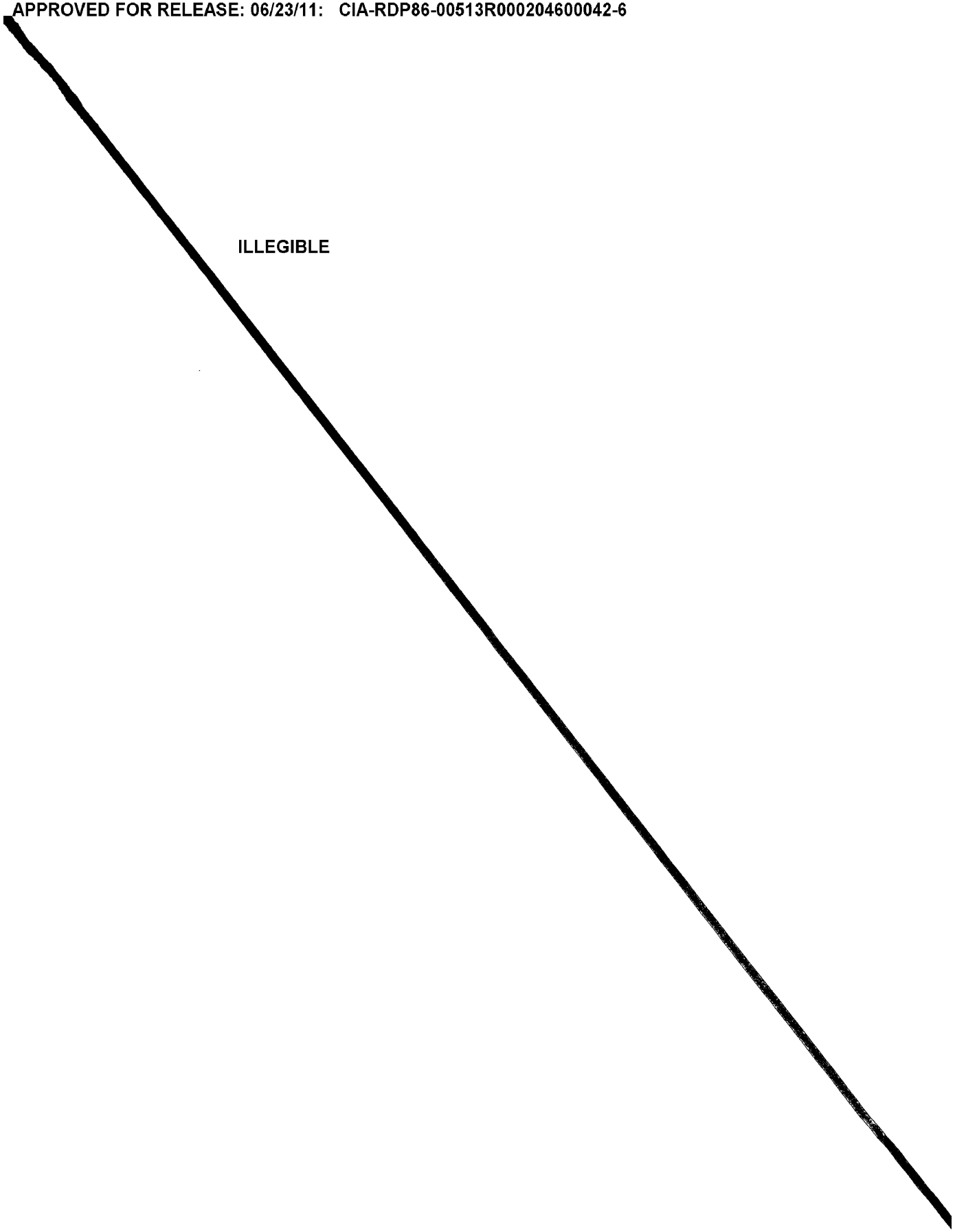

BELOGUROV, Yu.A.; BELYAYEV, A.F.; VISHNEVSKIY, P.; ZAKHAROV, V.N.; KAGANER, M.; MARGOLIN, L.M.; PASHKOV, Yu.S.; POLYAKOVA, Ye.A. SMIRNOVA, S.I.

In the Main Administration of the Hydrometeorological Service. Meteor. i gidrol. no.6:62 Je '64 (MIRA 17:8)

In the institutions of the Hydrometeorological Service. Ibid.: 63.

Meetings, conferences, seminars. Ibid.:63-64

Abroad. Ibid.:64.

BELYAYEV, A.F. (Moskva); LUKASHENYA, G.V. (Moskva)

Effective deflagration temperature of certain explosives.
PMTF no. 6:114-120 N-D '63. (MIRA 17:7)

ACCESSION NR: AP4033397

black powder and ammonium nitrate were similar. In experiments run with black powder of different densities (0.9 and 1.1 gm./cc), when the diameter of the charge was greater than critical, the rate of detonation increased almost linearly with density. The value of about 400 m/sec given earlier (G. Kast, Vzry*vchaty*e veshchestva i sredstva vosplamenenlya, 1932) for the rate of detonational conversion of black powder is apparently that for non steady-state convective burning.

ASSOCIATION: Akademiya nauk SSSR, Institut khimicheskoy fiziki (Academy of Sciences SSSR, Institute of Chemical Physics)

SUBMITTED: 29Dec62 ATD PRESS: 3057 ENCL: 00

SUB CODE: WA NO REF SOV: 008 OTHER: 000

Card 2/2

ACCESSION NR: AP4033397 S/0076/64/038/003/0579/0582

AUTHOR: Belyayev, A. F. (Moscow); Kurbangalina, R. Kh. (Moscow)

TITLE: Realization of detonation conditions for black powder

SOURCE: Zhurnal fizicheskoy khimii, v. 38, no. 3, 1964, 579-582

TOPIC TAGS: black powder, detonation, steady state detonation, critical diameter, combustion rate, nonsteady state convective burning, explosive

ABSTRACT: Conditions for the steady-state detonation of black powder have been realized for the first time. Since the critical diameter of black powder is large and its rate of combustion at high pressures is relatively low, it is impossible to cause detonation with a capsule detonator or with a detonating fuse passed through the powder. Detonation of considerable masses of loose black powder requires an intermediate detonator of large weight, e. g., a charge of finely ground low-density (0.6—0.7 gm/cc) trinitrotoluene. The detonation rates of

Card 1/2

ACCESSION NR: AP4042207

ENCLOSURE: 01

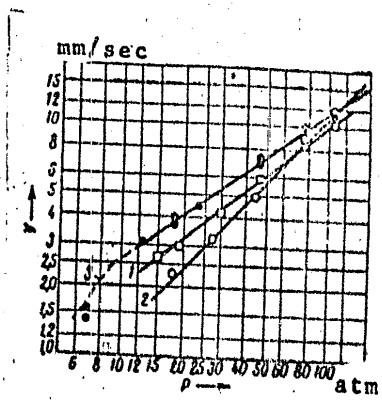

Fig. 1. Dependence of burning velocity on pressure

1 - Smokeless powder; 2 - PETN;
3 - PETN + charcoal.

Card 3/3

ACCESSION NR: AP4042207

powder at pressures above 10 atm is a heterogeneous process. In the initial stage, a dispersed system of gaseous decomposition products and solid particles is formed; in a later stage, exothermic reactions of the gaseous products take place on the surface of the glowing solid particles, which accelerate the reactions of the gaseous products, and this stage becomes the controlling factor for the burning velocity of the explosive. Experiments were also carried out with the burning of other explosives (trotyl, hexogen, and a mixture of trotyl with ammonium nitrate) containing 3—6% charcoal. These experiments also confirmed that the presence of charcoal accelerates the burning of explosives, owing to the formation of a dispersed system ("smoke") with glowing solid particles. Orig. art. has: 1 figure.

ASSOCIATION: Institut khimicheskoy fiziki Akademii nauk SSSR (Institute of Chemical Physics, Academy of Sciences SSSR)

SUBMITTED: 19Feb64 ATD PRESS: 3062 ENCL: 01

SUB CODE: FP, WA NO REF SOV: 006 OTHER: 002

ACCESSION NR: AP4042207 S/0020/64/157/002/0378/0380

AUTHOR: Belyayev, A. F.; Tsy*ganov, S. A.

TITLE: Mechanism of burning of smokeless powder at elevated pressures

SOURCE: AN SSSR. Doklady*, v. 157, no. 2, 1964, 378-380

TOPIC TAGS: burning mechanism, smokeless powder, burning velocity, PETN, charcoal

ABSTRACT: The burning velocities of smokeless powder, PETN, and a mixture of PETN and 5% finely ground charcoal were determined as a function of pressure, V(P), in a constant-pressure bomb in compressed nitrogen at 10—110 atm. The results are shown in Fig. 1 of the Enclosure. The curves of burning velocity vs. pressure show that both smokeless powder and the mixture of PETN and charcoal have higher burning velocities than PETN alone. Photomicrographs of the burning of the PETN-charcoal mixture showed the existence of a narrow layer of glowing solid particles located about 0.1 mm from the surface of the specimen. On the basis of published theories and experimental data from this and previous studies, the following mechanism for the burning of smokeless powder is proposed. The burning of smokeless

Card 1/3